A Demand Analysis for Wheat Imports to China

By

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Abstract

China has become an increasingly important, but uncertain, import market for grains since the 1960s. For past 35 years, the fluctuations in wheat imports between 2.3 million tonnes and 16 million tonnes has drawn the attention of economists and politicians around the world. In 1994, Lester Brown published a book titled *Who Will Feed China?—Wake-Up Call For a Small Planet*. Since then, grain import demand in China has again become a globally important topic.

Since 1978, China has reformed its economic system. These economic reforms and system transition in conjunction with the remains of the planning economy have been shaping China's economy into an economy with elements of both centrally planned and market-oriented economies, *i.e.* a “mixed” economy. These reforms have had large effects not only on grain production but, more important, also on domestic grain demand, which in turn has had major effects on the international grain market.

It is questionable whether conventional models of the demand for wheat are appropriate for China since China's wheat import demand is not purely market determined. Instead, an analysis of import behaviour must incorporate features of central planning. This study addresses the following questions: 1) what are the prominent characteristics of China’s planned and mixed economic systems and what are the determinants of grain import demand under a mixed systems? 2) what role have price signals in the world grain market played in China’s demand for wheat? This analysis also addresses questions such as what effects China’s economic reform has had on domestic grain policies and what have been the major changes in grain trade policy-making procedures before and after 1978?
Given the Chinese government’s “unique” grain system, stated policy of grain self-sufficiency, and China’s status as “an enigma in the world grain trade”, establishing a suitable model for Chinese wheat imports is a challenging job. In this study, a “mixed” model has been developed. This “mixed” model allows us to test the hypothesis that the regime shifted from a pure materials balance to a more marketing driven model where grain imports depend on prices and other market variables. The conclusion of this study is that China’s wheat imports are still centrally controlled and the material balance principle still dominates the wheat imports planning. However, the price effect has more influence on China’s wheat imports than it did before 1978.
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Chapter One:

Introduction

Section 1.1: Background and Significance

China is not only the world’s largest wheat producer but is also the largest wheat importer in the world today. Wheat is the second most important foodgrain in consumption, surpassed only by rice. It is also a major grain crop in China, in terms of both area planted and quantity produced. Wheat production in China has increased more than fivefold since the 1950s. This dramatic increase in wheat production has been the result of a number of factors including government grain policies, land reform, improved water conservation, application of mechanization, and the use of chemical fertilizers. More important, this dramatic increase has been due to the transformation of grain production and marketing systems since 1978 from a strict planning-oriented system into a more marketing-oriented system.

These economic reforms and system transition in conjunction with the remains of the planning economy have been shaping China’s economy into an economy with elements of both centrally planned and market oriented economies, (hereafter referred to as a ‘mixed economy’). These reforms have had large effects on domestic grain demand, which in turn have had major effects on the international grain market. Although the Chinese domestic grain market is becoming more market-oriented than previously, grain import demand in China is still centrally planned and

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1 China’s wheat output was 18 million tonnes in 1952 and 93 million tonnes in 1992.
2 “Mixed economy” — a transitional economy between planned economy and market economy, or a combination of planned and market economy. The basic features of a mixed economy are coexistence of state/collective ownership and private ownership and coexistence of the state market and the free market.
controlled by the Chinese government. Wheat consumption and import demand in China have been increasing not only because of population growth, but also because of some factors and changes generated from the procedures of the economic reform and system transition. These factors include increases in per capita incomes, population migration from rural to urban areas, decreases in land available for grain production, and a reduction in infrastructure investment in grain production from the government.

Since the 1960's, per capita consumption of wheat has increased and China has been a major importer of wheat. Historically, wheat has occupied a central position in the Chinese grain economy. Wheat consumption increased from 80 kg per capita during the 1960's to more than 100 kg per capita in 1990. In 1994, wheat consumption was estimated to be more than 120 kg per capita. Wheat imports jumped from 0.075 million tonnes in 1957 to 2 million tonnes in 1960 and then increased to about 14 million tonnes in 1990. In 1994 China's wheat imports reached more than 14 million tonnes, which was one fifteenth of total international wheat trade in that year. The US-based WorldWatch Institute has said that China, which imported some 17 million tonnes of grain in 1995, could face a deficit of between 200 million and 365 million tonnes of grain by 2030, which would put severe strains on international stocks. Because of the size of the Chinese wheat market, fluctuations in purchases from China affect world market variability, and the level of China's wheat imports has been a major factor affecting the general level of world wheat balance.

In the context of world wheat market analyses, a thorough understanding of China's import behavior is important. However, it is questionable whether conventional models of the demand for

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3 Grain Statistics Information (Liangshi Tongji Ziliao), China grain Bureau and Ministry of Internal Trade.
4 FAO: International Agricultural Yearbook, 1995
wheat are appropriate for this purpose since the quantity of China’s wheat import demand is not purely market determined. Instead, an analysis of import behaviour must incorporate features of central planning. The emphasis should be on understanding the system with an eye on the process of transforming the decision making from central to market oriented.

Section 1.2: Statement of Research Problems

Timmer and Jones (1986) describe China as ‘an enigma in the world grain trade” (p27). Carter and Zhong (1988) state that “China has played a very important role in the world grain market in the past, but, given its recent economic reforms, its future participation is uncertain” (p111). The question of how the Chinese government determines the quantity of wheat or grain trade is answered qualitatively by Minden (1985) who states ‘China’s wheat import policy is an integral part of two policy systems: food policy and foreign policy... In spite of the CCP’s\[^5\] professed preference for long-term planning, Chinese [wheat] import policy seems to respond to demand on an \textit{ad hoc} basis” (p103). Butler (1986) states that ‘no calculation can provide an accurate prediction of what will in the end be a political decision. Current trends suggest that [China’s] net grain imports on a significant scale are being incorporated into national planning for the next decade” (p125).

This thesis addresses the question of whether China’s wheat imports are based on \textit{ad hoc} government policies or on determinative factors. We examine the differences between a grain planning economy and a ‘mixed economy.” A central question in this thesis is thus what effects

\[^5\] Minden does not mention what "CCP" stands for. Normally, CCP stands for "Chinese Communist Party". But in the context of Chinese wheat imports, CCP probably is an acronym for The Central Commission of Planning, a key policy maker in China’s grain trade.
China’s economic reforms have had on domestic grain policies and what have been the major changes in grain trade policy-making procedures before and after 1978.

Most of the studies to date on Chinese wheat imports have used conventional western models in which prices and exchange rates are the major determinants of import quantities to estimate China's grain trade and wheat demand. These models can not answer the following questions:

a) What are the prominent characteristics of China's Planned and Mixed Economy Systems and what are the determinants of grain import demand under the Planned and Mixed systems?

b) What role have price signals in the world grain market played in China's demand for wheat in different systems?

and

c) Which methodology is more realistic for modeling China's wheat import demand: the "conventional western models" or the model originating from China's "centrally planned model" or some combination of these two models?

These issues are vital for a better understanding of China's grain trade pattern as well as the nature of the new policies and their potential effect on China's domestic grain production, consumption and trade patterns towards the beginning of the 21st century.

Section 1.3: Objectives of Study

A useful model of China's wheat import demand must capture key systematic elements embodied in China's wheat trade program. Such a model will help understand China's position in
the overall international wheat trade market and how China's grain policy changes affect the world wheat market.

There are two major objectives of this thesis. The first objective is to introduce China's grain system and the main features of grain trading. This will be accomplished through use of the background information and statistics concerning China's grain economy, a description of China's economic reforms, and a discussion of the effect of the transition of the economy on wheat trade.

The second objective is to develop a theoretical model of China's wheat import demand. After introducing the "Centrally Planned Trading Model" which is based on a centrally planned economy, we test the model to determine if it is superior to the market-based model in explaining China's wheat import demand. A model that incorporates aspects of the conventional trade theory and planned trading theory (the mixed model) will also be tested. The "mixed" model allows for testing if the shift from a centrally planned economy to a more western style, market-oriented economy influences demand for wheat imports.

The rest of this thesis is outlined as follows: Chapter Two describes the characteristics of the Chinese agricultural economy and features, China's grain production, and consumption. Chapter Three focuses on the changes in China's domestic grain marketing system, grain foreign trade system, and the effects these changes have had on wheat import demand in China. We will address wheat imports from 1960 to 1994. This period includes both the planned economy period (1960–1977) and the "mixed" economy period (1978–1994). Statistics describing China's wheat imports for the study period begin to tell the story of the effects of the economic reforms in China on the international wheat market. The chapter also describes the changes in the marketing
systems over the past 45 years, with sub-period breakdowns (1950–1978 and 1978–1994). The sub-period breakdowns help identify changes in China internal and external grain economy and system transition that influence wheat import demand. Chapter Four introduces major features of the world wheat situation, including wheat production, consumption and trade. Chapter four also introduces China’s important role in the world wheat market. Chapter Five first reviews the literature and previous studies on the conventional western demand theories and modeling. Then we introduce the central planning trade model. The relevant methodologies are also introduced in this chapter. The chapter reviews the disadvantages and advantages of each model. The comparisons from the two wheat import demand models will show us that it is necessary to consider a “mixed” model. Chapter Six presents theoretical considerations and model specifications. Chapter Seven presents different models and their functional forms. The regression results are detailed discussed with several issues concerning our study. Chapter Eight briefly assesses China’s future pattern of grain trade in three aspects: China’s future net trade position, the scale of China’s net grain trade, and the composition of China’s grain imports.

Chapter Nine summarizes the findings of the thesis and presents some potential and promising topics on China's grain trade in future research. The final purpose of this summary chapter is to discuss the implications of the various conclusions for China’s wheat import.
Chapter Two:

The Basic Features of China's Grain Economy and Its Development

Section 2.1: China’s Agricultural Economy and Its Features.

China’s population was more than 1.2 billion in 1995. Its economy is still heavily based on agriculture; according to the Chinese Statistics Yearbook 1995, approximately 70% of the Chinese population lives in the countryside, 72% of the labor force is involved in the agricultural sector, and 30% of GNP comes from the agricultural sector.

2.1.1: General development of agriculture in China.

Traditional agriculture in China is characterized by small, independent household farms with less than one hectare of fragmented landholding. When the Chinese Communist Party gained control of the country in the late 1940s, they carried out a land-reform program that spread across the nation by 1952. Under this program, the government confiscated land from landlords and rich farmers, without compensation, and gave it to poor and landless peasants. Individual household farms were then collectivized in 1953 under the provisions of the First Five-Year Plan. The collective farming system prevailed until the introduction of the household responsibility system (HRS) in the late 1970s. The land reform of 1952 ended the semi-feudal agricultural system in rural areas and was designed to emancipate the productive forces on the basis of which the

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1 According to China’s latest census of October 1st, 1995.
2 As in the former USSR and other centrally planned economies, the Chinese government makes national economy development plans based on a “Five-Year Plan”. The First Five-Year Plan was implemented in 1953. In 1996 China embarked on its Ninth Five-Year Plan.
3 The HRS was the starting point of the economic reform in China’s grain production system. It allowed agricultural household to take its own responsibilities and to make its own decisions about its economic activities.
Chinese farmers would be guided onto the road of mutual aid and cooperation. The state carried out the socialist transformation of the small scale agricultural economy and assumed the public ownership of the basic means of agricultural production. This established the socialist agriculture cooperative economy and brought agriculture onto the track of the planned state economy.

From the early 1950s to the late 1970s, Chinese agricultural development was strongly influenced by the political environment. The government tightly controlled or deeply intervened in every economic sector and the government policy directly influenced both production organizations and marketing systems. On the other hand, since the 1960s, the Chinese government has carried out a national industrialization movement in the national economy and put more investment into industrial sectors than into agriculture, although the central government often calls for more attention to be paid to grain production. Since 1978, the Chinese government has been carrying out economic reforms in which it has indirect government control of the national economy, especially in grain production systems. The household responsibility system is one such reform. However, the reforms give more freedom to industrial sectors than to the grain sector and the centrally planned system still dominates the economy, especially in grain marketing system.

The economic reforms of 1978 have stimulated growth in China's industrial sectors. Before 1978, under the "socialist-planning system"\(^4\), all sectors increased at a slow rate with certain fluctuations.\(^5\) After 1978, under the "socialist-marketing system", both the light and heavy industrial sectors increased at accelerated paces while the agricultural sector continued to grow at only a slow pace and with little acceleration. In 1952, agricultural output was estimated as 58% of

\(^4\) The Chinese government calls its system before 1978 a "Socialist-Planning System" and calls its system after 1978 a "Socialist-Marketing System".

\(^5\) 1958-1961 is the period of "Great Leap Forward" and 1966-1977 is the first period of "Great Cultural Revolution".
the national income while industry was estimated at 20%. In 1994, agricultural output was recorded as 27% of the national income while industry contributed almost 50% of national income. The index of the real gross value of agricultural output increased with an annual growth rate of less than 5% between 1952 and 1992. The trends of agricultural and industrial development are shown by indices in Figure 2.1. The figure indicates that the more market oriented policies after 1978 coincide with rapid growth in both the industrial and agricultural sectors. The centrally planned agricultural policies before 1978 coincided with more increases in industrial sectors than in agricultural sectors.

**Figure 2.1: Indices of the Value of Gross Output by Sectors.**

Index 1952=100

Sources: *China Statistics Yearbook, 1982-1995*
2.1.2: Classification of Agricultural products in China

China's agricultural production is traditionally classified by five areas: crop farming, forestry, animal husbandry, fisheries and sideline occupations. The percentage of the five components in agricultural gross value output is shown in Table 2.1.

Table 2.1: The component percentage of agricultural production for selected years (%).

<table>
<thead>
<tr>
<th>Year</th>
<th>Crop Farming</th>
<th>Forestry</th>
<th>Animal Husbandry</th>
<th>Fishery</th>
<th>Sideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>74.2</td>
<td>1.6</td>
<td>11.2</td>
<td>1.3</td>
<td>12.4</td>
</tr>
<tr>
<td>1958</td>
<td>73.6</td>
<td>3.4</td>
<td>12.4</td>
<td>2.1</td>
<td>11.1</td>
</tr>
<tr>
<td>1966</td>
<td>76.4</td>
<td>2.3</td>
<td>13.7</td>
<td>1.7</td>
<td>6.1</td>
</tr>
<tr>
<td>1975</td>
<td>77.1</td>
<td>3.1</td>
<td>14.1</td>
<td>1.7</td>
<td>4.0</td>
</tr>
<tr>
<td>1978</td>
<td>76.5</td>
<td>3.4</td>
<td>15</td>
<td>1.6</td>
<td>3.3</td>
</tr>
<tr>
<td>1984</td>
<td>68.4</td>
<td>5.0</td>
<td>18</td>
<td>2.7</td>
<td>5.8</td>
</tr>
<tr>
<td>1990</td>
<td>58.6</td>
<td>7.3</td>
<td>26</td>
<td>5.4</td>
<td>6.2</td>
</tr>
<tr>
<td>1994</td>
<td>52.9</td>
<td>8.6</td>
<td>28</td>
<td>6.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Period 1 (1961-77) Average</td>
<td>75.4</td>
<td>2.7</td>
<td>12.9</td>
<td>1.7</td>
<td>7.2</td>
</tr>
<tr>
<td>Period 2 (1978-94) Average</td>
<td>63.9</td>
<td>4.6</td>
<td>22.7</td>
<td>4.1</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Source: China Statistics Yearbook, 1984-1995

Table 2.1 shows that although crop farming has remained the largest portion of Chinese agricultural production since the 1950's, its proportion in total agricultural output has decreased since 1978. In period 1, crop farming made up 75% of total agricultural output while in period 2, crop farming was 64% of total agricultural output. Although crop farming output still makes up more than 60% of agricultural production, its share in agriculture production has decreased from

---

6 Sideline occupations include collecting wild plants, hunting wild animals, households' handicrafts and rural industry run by basic production units.
period 1 to period 2. Another important fact is that animal husbandry production jumped from 13% to 23%, which makes China the second largest meat producer in the world today.\footnote{Tsing Dao Daily, March 5th, 1996.}

Table 2.2 shows the major components of crop farming, their outputs and the trends of growth. Crop farming is defined by the Chinese government to include grain crops and commercial crops. Grain crops include wheat, corn and other foodgrains. Commercial crops include cotton, oil-bearing crops, sugar-yielding crops, fruit, and tobacco. Historically, grain crops are the most important component of crop farming and have dominated crop farming in term of both output and area sown.

\textit{Table 2.2: Major crops output and their changes for selected years (million tonnes).}

<table>
<thead>
<tr>
<th>Year</th>
<th>Grain</th>
<th>Cotton</th>
<th>Oil-bearing</th>
<th>Sugar-Yielding</th>
<th>Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>163.9</td>
<td>1.3</td>
<td>4.2</td>
<td>7.6</td>
<td>2.4</td>
</tr>
<tr>
<td>1958</td>
<td>200.0</td>
<td>2.0</td>
<td>4.8</td>
<td>15.6</td>
<td>3.9</td>
</tr>
<tr>
<td>1966</td>
<td>214.0</td>
<td>2.3</td>
<td>4.3</td>
<td>14.0</td>
<td>4.1</td>
</tr>
<tr>
<td>1975</td>
<td>284.5</td>
<td>2.4</td>
<td>4.5</td>
<td>19.1</td>
<td>5.4</td>
</tr>
<tr>
<td>1978</td>
<td>304.8</td>
<td>2.2</td>
<td>5.2</td>
<td>23.8</td>
<td>6.6</td>
</tr>
<tr>
<td>1984</td>
<td>407.3</td>
<td>6.3</td>
<td>11.9</td>
<td>47.8</td>
<td>9.9</td>
</tr>
<tr>
<td>1990</td>
<td>446.2</td>
<td>4.5</td>
<td>16.1</td>
<td>72.2</td>
<td>18.8</td>
</tr>
<tr>
<td>1994</td>
<td>409.3</td>
<td>4.1</td>
<td>20.5</td>
<td>109.2</td>
<td>46.2</td>
</tr>
<tr>
<td>Period 1 Average</td>
<td>215.6</td>
<td>2.1</td>
<td>4.4</td>
<td>14.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Period 2 Average</td>
<td>391.9</td>
<td>4.3</td>
<td>13.4</td>
<td>63.4</td>
<td>20.4</td>
</tr>
</tbody>
</table>


However, the growth rates among these crops are uneven, especially after 1978. The remarkable increases for all crops happened after 1978; the crops with faster growth rates are commercial crops. The output of grain crops jumped from 305 million tonnes in 1978 to 446
million tonnes in 1990 and then decreased by about 40 million tonnes in 1994. One of the major reason for the increase in grain output was due to improvement in yields due to grain marketing reform. Overall grain production in China has increased fourfold since the 1950s. We will introduce China's grain production and development in Section 2-2 of this chapter, after we briefly discuss China's agricultural management system.

2.1.3: Land resources and utilization.

China has almost 10 million square kilometers of territory with widely varying topography. China's terrain varies from mountainous areas in the west, with mountain elevations of more than 4,000 meters, to lowlands in the east. Of the total land area, mountains make up about 33%, plateaus make up about 28%, basins make up about 17%, hilly lands make up about 10% and plains make up about 12%. Thus the upland areas, which include mountain regions, hilly land and comparatively rugged plateau, cover around two thirds of the total area. The terrain, intermingled and combined with the effects of latitude and climate, has created a complex pattern of natural regions which is not favorable for grain production. The variable physical conditions have led the Chinese to adopt equally varied systems of crop farming, animal husbandry, forestry, fishery and sideline occupations.

Chinese agricultural land can be characterized by the scarcity of arable land, its uneven quality, and the uneven distribution of productive land. Despite China's large land area, its productive land resources are extremely low relative to its large population. This can be best indicated by comparing the areas per capita of different types of land in China with the corresponding world averages (see Table 2.3). On the other hand, of the over 33 million hectares
of expandable land in the country, only 10 million hectares are of relatively good quality. There is therefore little room for China to have more potentially productive land.

Table 2.3: Land availability in China and the World (hectare per capita)

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>World Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total land area</td>
<td>&lt; 1</td>
<td>3.3</td>
</tr>
<tr>
<td>Cultivated land</td>
<td>0.09</td>
<td>0.34</td>
</tr>
<tr>
<td>Forest area</td>
<td>0.12</td>
<td>1.03</td>
</tr>
<tr>
<td>Grassland</td>
<td>0.32</td>
<td>0.76</td>
</tr>
</tbody>
</table>


Two achievements of the Chinese farming system are frequently mentioned: it has fed an exploding population since the 1950s, and it has supported a dramatic structural change in China’s economy since 1978. When the socialist agricultural system was founded in 1952, the growing area was about 0.25 hectares per capita. By 1978 this figure had dropped to 0.14 hectares and by 1994, this figure was as low as 0.09 hectares. These changes were partly due to the result of industrialization policy and rapid population growth. China’s population increased from more than 400 million in the 1950s to 1.2 billion in 1994. The average natural growth rate of the population was about 23 % from 1952 to 1978 and about 14 % from 1979 to 1994. However, the total grain growing area in China has been decreasing since 1952. The grain growing area declined from 124 million hectares in 1952 to 112 million hectares in 1992. Therefore, the per capita grain growing area changed from 0.23 hectares in 1952 to 0.09 hectares in 1994.
2.1.4. The improvement of production conditions

Historical records show that in the 2,000 years before 1950, the country was hit by 1,092 major floods and 1,056 major droughts (i.e. there was an average of major flood and a major drought every year.) Figure 2.2 presents China’s grain growing area suffering from natural disaster in past 35 years. During 1952 and 1994, the annual average grain growing area suffering from natural disasters was about 245 million hectares. It is clear that China does not possess favorable natural conditions for farming. But when we take look at the two time periods, one from 1960 to 1977 and another from 1978 to 1994, we can see how different the variations of the changes for the disaster area in these two periods are.

Figure 2.2: China's grain growing area suffering from natural disaster from 1952 to 1994.

Sources: USDA and China Statistics Yearbook.

Although the variance of the natural disaster area in the second period was lower than the variances of the first period, the average of natural disaster area for the second periods was 310
million hectares which is highest than the average of 220 million hectares in the first period. Second, the total natural disaster area in the second period was 4.4 billion hectares, which is also higher than 3.1 billion hectares in the first period. Third, although the average natural disaster area from 1978 to 1994 was over 305 million hectares which is higher than the average value for the 40 years, China’s grain output has dramatically increased since 1978. Since grain area occupies more than 80% of agricultural land, this states that the growth of China’s grain output has mainly been produced from the increases of improved grain yields since the 1950s, even though the natural disaster areas for grain production are still at a higher level.

Although agricultural activities in China are traditionally highly labour intensive, a steady process of mechanization has been moving forward by increasing the supply of electricity and petroleum to agriculture. Table 2.4 presents China’s improving conditions in agricultural production.

Table 2.4: A Summary of China’s Agricultural Production Conditions.

<table>
<thead>
<tr>
<th></th>
<th>1952</th>
<th>1978</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total reservoir capacity (billion cubic meters)</td>
<td>300</td>
<td>3,800</td>
<td>4,500</td>
</tr>
<tr>
<td>Capacity of irrigation &amp; drainage equipment (million hp)</td>
<td>1.2</td>
<td>5.03</td>
<td>928.6</td>
</tr>
<tr>
<td>Area under irrigation (million hectares)</td>
<td>19.96</td>
<td>45.2</td>
<td>49.5</td>
</tr>
<tr>
<td>Large &amp; medium-sized tractors (1,000)</td>
<td>130</td>
<td>558</td>
<td>785</td>
</tr>
<tr>
<td>Heavy trucks for agricultural use (1,000)</td>
<td>0.3</td>
<td>74</td>
<td>617</td>
</tr>
<tr>
<td>Total power capacity of farm machinery (million hp)</td>
<td>0.25</td>
<td>163</td>
<td>4,171</td>
</tr>
<tr>
<td>Electricity consumed (billion kw)</td>
<td>0.5</td>
<td>253</td>
<td>986</td>
</tr>
<tr>
<td>Fertilizer applied (10,000 tonnes)</td>
<td>7.8</td>
<td>8,84</td>
<td>3,000</td>
</tr>
<tr>
<td>Tractor-ploughed farmland (million hectares)</td>
<td>1.4</td>
<td>408</td>
<td>536</td>
</tr>
</tbody>
</table>

Source: China Statistics Yearbook.
By the end of 1992, the stock of mechanized farm power totaled about 300 million kilowatts including about 800,000 tractors, 750,000 walking tractors and more than 50,000 combine harvesters. The machine-ploughed areas totaled about 50 million hectares, accounting for 43% of all farmland, and the machine-sown area accounted for 12% of the total. The increase in the level of mechanization has been one of the critical factors enabling the sustained increase in intensity of farming shown by a rise in the cropping index over the last four decades.

Increased use of chemical fertilizer has been the other main contributor to the rapid rise of grain crop yields worldwide since the Second World War. In China, chemical fertilizer has had its greatest impact on yields since the 1960s. It is expected by the World Bank (1985a) that further increases in the use of fertilizers will be the main way of achieving continued increases in grain output in the future. The chemical fertilizer industry in China was established in 1950 and has grown rapidly since then. During 1971-1975, 13 large scale chemical fertilizer plants were set up by the Chinese government. These large enterprises, together with more than 1,300 small nitrogenous fertilizer plants and around 50 medium-sized ones, formed a network of nitrogenous fertilizer production throughout the country. Chemical fertilizer use in 1952 amounted to just 78,000 tonnes, by 1992 about 30 million tonnes of fertilizer were applied.

In summary, grain production in China has increased more than fourfold since the 1950s. This dramatic increase in production has been due to a number of factors: government grain policies, land reform, improved water conservation, application of mechanization and the use of chemical fertilizer. More important, it has been due to the transition in production and marketing systems from one of centrally planned system to one of marketing oriented system since 1978.
Section 2.2: Grain Production and Development in China

According to the government’s “The Ninth Five-Year Plan”¹: China’s grain output should reach 500 million tonnes per year by the year 2000. This target is only moderately higher than grain output in 1994 of approximately 422 million tonnes and reflects a lack of confidence on the part of the government that there will be large increases in grain production in the coming years.

The Chinese government has been trying to improve its grain production system since it instituted the Household Responsibility System (HRS) in 1978. The effort has not shown to be successful because of the government’s reluctance to move away from central control. Premier Zhao Ziyang (1980) stated we must firmly be persistent in our socialist economy with a planned marketing system and any attempt to free market without central planning must be not permitted. It is clear that although the Chinese government does not want to change its entire centrally planned economy to a complete free market economy, its grain economy framework has been on the track of more marketing oriented system since the economic reforms of 1978. This section introduces the importance of China’s planned and mixed grain production systems.

2.2.1 Grain Production Systems in planned framework.

Before 1978, grain production in China was strictly planned and managed at central and local governments, which included provincial, prefecture and county governments. The Chinese planned grain economy had two kinds of rural enterprises: state farms and collective farms (collective farm included the commune, production brigades, production teams, and agricultural households). The planning process was different for state farms and collective farms. Neither state

¹ The Ninth Five-Year Plan started at the end of 1996.
farms nor collective farms had any freedom to decide how much and what to plant. This system prevailed from the early 1960s to the late 1970s. Figure 2.3 depicts this agricultural planning process. The arrows in the figure indicate the delivery of the plans either between the governments at different levels or between the governments and the enterprises.

**Figure 2.3: Agricultural planning process in the planned economy.**

![Diagram of agricultural planning process in the planned economy.]

**State farm planning:** State farms drew up their own preliminary plans according to national objectives and previous production. The copies of plans were then sent to the provincial government. After reviewing and balancing these preliminary plans, the provincial governments sent a draft plan to the central government. The State Planning Commission and its subordinate ministries received the draft plans for state farms and integrated them into a comprehensive plan for the whole economy at an annual planning convention. The relevant local plans were then
Collective farm planning: For collective farms, the planning process was relatively indirect. First, the central planners estimated demand and supply for each important and centrally controlled good, including grain, to form a draft plan. After considering grain transfer between the provinces and possible trade with other countries, the State Planning Commission brought the total quantity of grain supplied and demanded into balance for each province. The initial plans were sent down to province-level administrations. The corresponding planning commissions in the provinces broke plans down among their subordinate prefectures, subordinate counties, and state farms. The county planning commissions distributed plan targets to their subordinate communes. Then the communes allotted goals to their brigades and finally to production teams, the basic production and accounting units.

At each local level, individual units received their target input allocations and output quantities. Managers, farmers and accountants compared the targets with their own projections, then adjusted their goals and sent revised figures back up through the planning chain. The central ministries and commissions evaluated the revised targets, repeated the material balance procedure, and used the results for the final plan to be officially approved by the State council.

Approved annual plans were formulated at the provincial level, then sent through the same process of disaggregation. They eventually became provincial annual plans. Finally, the provincial planner sent annual plans to the counties, then to communes, brigades, and production teams.
Individual units received their output quotas and figures for their resource allocation and organized their production by seasons.

2.2.2: Grain Production System in the Mixed Framework.

Starting in the late 1970s, the collective farms disappeared and the limited free market emerged, causing a relatively significant decline in government influence on the grain production. The Chinese grain production system moved from a planned to a “mixed system” which integrates central planning with the market mechanism. The state-planned market is still dominant; the free market is merely an auxiliary means of regulating the economy.

To show the system transition in China’s grain production system, we mainly focus on the distinctions, rather than the similarities, between the mixed and planned grain production frameworks. Figure 2.4 depicts the planning process in the mixed grain economy. The arrows in the graph indicate the transmission of the plans between the central government and local governments, and between the local governments and production units in rural areas. The most significant institutional change that has occurred since the reform is that rural households have replaced state farms and production teams\(^2\). Rural household became the fundamental units of production management in the agricultural sector. Ownership of the land and other major assets still rested with the government. The planning process for state farm households and agricultural households is similar to that for the previous state farms and production teams, except that the plan targets and sales quotas now must correspond with household sizes and production situations.

\(^2\) In China the households that belonged to the state farms are called state farm households and the households that belonged to the production teams are called agricultural households
One of the factors in grain production growth is the incentive effects of the abolition of the communes and the introduction of the household production responsibility system. The Household Production Responsibility System (HRS) consists of contracts that define the rights and responsibilities of owners (including state, collective, and private) and managers of assets. Under the HRS, households have the right to manage collectively owned land according to their size or labor force. The households are obligated to pay agricultural taxes, make contributions to social welfare funds, and provide their share of state grain procurement requirements. All remaining output belongs to the households.

After the reform, farm production increased annually by 6.2 percent, three times the rate of the previous two decades (Johnson, 1990). However, since 1990 grain production has been
declining after continuous increases in the 1980s. Carter and Zhong (1989, p56) point out “China’s grain production is largely influenced by government policies, policy changes were major factors underlying the different growth rates of grain production and yield.”

Overinvestment in industrial sectors and underinvestment in agriculture may explain the slow pattern in China’s grain output after 1990. In 1980, the Chinese government announced that transportation and energy production would be given top priority in the national economy. It was assumed by central planners that the decline in agricultural investment from the state would be compensated by agricultural households. As a result, the underinvestment of agriculture has resulted in poor rural infrastructure and insufficient agricultural research. Table 2.5 shows the agricultural shares in national total output, in total national income, and total government investment. After 1980, although the agricultural sector produced an average 20% of total output and an average 48% of national income, the average agricultural investment was only 4.5% of total government investment.

Table 2.5: Shares of Agriculture in Total Output and Government’s Investment (%).

<table>
<thead>
<tr>
<th>Year</th>
<th>% of Total Output</th>
<th>% of National Income</th>
<th>% of Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>17.1</td>
<td>46.3</td>
<td>11.3</td>
</tr>
<tr>
<td>1966</td>
<td>29.7</td>
<td>38.2</td>
<td>17.6</td>
</tr>
<tr>
<td>1973</td>
<td>24.6</td>
<td>44.0</td>
<td>9.8</td>
</tr>
<tr>
<td>1980</td>
<td>22.5</td>
<td>48.9</td>
<td>6.6</td>
</tr>
<tr>
<td>1988</td>
<td>19.7</td>
<td>46.1</td>
<td>3.1</td>
</tr>
<tr>
<td>1994</td>
<td>17.4</td>
<td>49.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: China Statistics Yearbook, Various issues.
2.2.3: The change in grain growing areas

Table 2.6 shows the changes in total farming area, grain growing area and commercial crop area for more than 30 years. Three characteristics should be noted from this table. The major factors affecting these characteristics, in addition to the government’s policies for national economic development, are the government’s agricultural production and marketing policies.

Table 2.6: growing areas for grain crops and commercial crops (million hectares).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Farming Area</th>
<th>Grain Crops</th>
<th>Commercial Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area</td>
<td>%</td>
<td>Area</td>
</tr>
<tr>
<td>1952</td>
<td>142.4</td>
<td>125.0</td>
<td>12.6</td>
</tr>
<tr>
<td>1962</td>
<td>141.4</td>
<td>122.6</td>
<td>8.8</td>
</tr>
<tr>
<td>1977</td>
<td>150.5</td>
<td>121.4</td>
<td>13.6</td>
</tr>
<tr>
<td>1984</td>
<td>145.4</td>
<td>113.9</td>
<td>19.5</td>
</tr>
<tr>
<td>1989</td>
<td>147.7</td>
<td>113.1</td>
<td>21.2</td>
</tr>
<tr>
<td>1994</td>
<td>153.5</td>
<td>112.7</td>
<td>25.2</td>
</tr>
</tbody>
</table>

Data Source: China Statistics Yearbook, Various issues.

In Figure 2.5, we can see that total farming area has been generally increasing with some ups and downs in certain years. The total areas increased by 7.8 percentage from 1951 to 1994. However, the growth in total farming area from 1977 to 1994 was less than 2%. The percentage of area for grain crops in total farming land has decreased from 87% to 73% over 40 years. Carter and Zhong (1989, p52) stated that “the shifting of grain arable land to non-grain uses is likely to continue and quite possibly to be accelerated in the coming decades.” The percentage of total area dedicated to commercial increased from less than 9% in 1952 to more than 16% in 1994. The major growth in the commercial crops area took place between 1978 and 1994. Under the current
grain production system, agricultural households have more freedom to increase their income by planting more commercial crops, if they can meet assigned grain crops targets and sales quotas.

Figure 2.5: Growing Area of Major Grain Crops in China.

Although the total growing areas for major grain crops, such as rice, wheat and corn, increased from the early 1960s to the middle 1970s, the area sown to rice has been declining, and the areas sown to wheat and corn have been growing only slowly. The decrease of the rice growing area has affected China's ability to export rice since 1978. The slight increases on corn production has been a major reason for China's increased corn exports. On the other hand, although the area sown to wheat has grown, wheat imports have also grown due to a rapidly growing population.

2.2.4: The features in grain output

Although the grain growing area has been declining for more than 30 years, the total output of grain increased more than 200% from 143.5 million tones in 1960 to 446.3 million tonnes in 1990 due to technology improvement and preferable grain policies (See table 2.7).

Table 2.7: Grain output in China for selected years (m.m.t).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Grain</th>
<th>Rice</th>
<th>Wheat</th>
<th>Corn</th>
<th>Soybean</th>
<th>Tubers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>143.5</td>
<td>59.8</td>
<td>22.2</td>
<td>13.5</td>
<td>6.4</td>
<td>21.9</td>
</tr>
<tr>
<td>1970</td>
<td>240.0</td>
<td>110.0</td>
<td>29.2</td>
<td>33.3</td>
<td>8.7</td>
<td>26.8</td>
</tr>
<tr>
<td>1978</td>
<td>304.5</td>
<td>136.9</td>
<td>53.9</td>
<td>56.0</td>
<td>7.6</td>
<td>31.8</td>
</tr>
<tr>
<td>1985</td>
<td>379.9</td>
<td>168.6</td>
<td>85.8</td>
<td>63.8</td>
<td>10.5</td>
<td>29.6</td>
</tr>
<tr>
<td>1990</td>
<td>446.3</td>
<td>189.3</td>
<td>98.3</td>
<td>96.8</td>
<td>11.0</td>
<td>28.8</td>
</tr>
<tr>
<td>1994</td>
<td>422.2</td>
<td>180.3</td>
<td>92.9</td>
<td>96.0</td>
<td>12.9</td>
<td>28.0</td>
</tr>
</tbody>
</table>

Sources: FAO, USDA and China Statistics Yearbook.

The output growth in grain experienced since the 1980s (see table 2.7) has been achieved by means of water control (improved irrigation and drainage), increased use of chemical fertilizers, more responsive and thus higher yielding seed varieties, and mechanization (Timmer, 1976; Barnett, 1981; World Bank, 1985b). This large injection of modern inputs is the main distinction from the traditional intensive farming. Historical development of China’s grain production has followed an erratic course with certain fluctuations. Because there have been no dramatic shocks in inputs use or technological change, the shifts in government policies are considered as the principal factor explaining grain output pattern and growth rate.
Section 2.3: The Pattern and Trends of Grain Consumption in China.

The demand for grain in China has grown substantially since the 1960s. Although per capita levels of consumption in urban area have not increased dramatically (and, in fact would be expected to decline due to the increased consumption of meat in the diet as incomes rise), total demand for grain has increased due to large population growth and increased per capita consumption in the rural areas. China is entering the middle-income, high-growth stage of economic development which, according to Johnson (1991), is characterized by a more rapid growing demand for cereals for food and feed purposes than can be met by domestic production. Walker (1984) indicated that the key determining factor for the growth of grain consumption in China is the combined result of rapid population increase and a high income elasticity of demand for grain at prevailing low level of per capita income. The combination of a large population and an increasing per capita income make China one of the potentially most significant grain import markets in the world. Despite the economic nature of central planning in the grain sector during the last four decades, imported grain is mainly consumed by the population residing in major cities. This section therefore focuses on grain consumption in urban areas.

2.3.1: Population growth.

According to the 1995 census, the total population in China is more than 1.2 billion, which accounted for more than one fifth of the total world population. The four characteristics of China’s population since the 1950s are the speed of growth, the pattern of change, the transitions it has undergone and the age structure.

Figure 2.6 shows China’s population increases and their growth speed in urban and rural areas for the last 30 years. It is clear that the population increase in urban area is faster than it does
in rural area after 1978. Although the population has grown by only 1.5 % per year after 1978, the large population base means a net increase of more than 10 million people per annum. The population increase in urban area has forced the Chinese government to change and diversify its grain trade patterns since most of China's imported grain is distributed to China's cities. Because of the lack of good transportation infrastructure in China, this transition makes it cheaper to import grain than transport it from other regions of China. It is also in the urban areas that per capita income growth has been the fastest since the reform began in 1978.

*Figure 2.6: the growth trend of China's Population.*

![Graph showing the growth trend of China's Population](image)


One of the features of China’s population issue is the age structure. In 1994, more than 28% of the total population was under the age of 16, and more than 61% of the population was between the ages of 17 and 59. Under China’s urbanization policy, most of the population currently living in rural areas will move into cities and towns gradually. This is why the population
in urban areas has been increasing since 1978, and this has put more pressure on grain demand in urban areas.

2.3.2: Income growth and food consumption

Carter and Zhong (1989) point out that the consumption level of food grain, meat and spirits is determined by personal income levels and established consumption habit. Traditionally, the per capita incomes in China have been quite different between areas, not only urban and rural, but also the regions. Consumption habits, in turn, are determined by historical income levels. Carter and Zhong (1989) suggest that the whole population should be grouped according to the income level per capita. In China, the greatest income gap among social groups exists between urban and rural residents. Until the end of the 1970s, per capita disposable income growth was constrained by the government policy of maximizing capital accumulation in order to speed the pace of industrialization. It is only in the very short period since 1978 that a new trend has emerged. This is associated with the commitment by the Chinese government to improve the income and daily living standards of the population. On the other hand, as was mentioned earlier, wheat imports are consumed mainly by the population in urban areas. It is therefore reasonable to divide whole population into two groups—population in urban areas and in rural areas.

The main point to notice from the figure are the rapid increase in comes since the late 1970s, especially in the urban areas, and the increase in the gaps between urban incomes and rural incomes. This growth has stimulated the demand for meat and vegetables in both rural areas and urban areas, and demand for grain in rural areas. The per capita demand for grain in urban area has
not increased since consumption has shifted to more luxury items such as meat and vegetable with the income increase.

Figure 2.7 illustrates that the rapid increase in income has occurred since the late 1970s, especially in the urban areas. Furthermore, the increase in the gap between urban incomes and rural incomes has increased since the late 1970s as well. This growth has stimulated the demand for meat and vegetables in both rural areas and urban areas, and demand for grain in rural areas. The per capita demand for grain in urban area has not increased since consumption has shifted to more luxury items such as meat and vegetable with the income increase.

Figure 2.7: Per capita income in Urban and Rural areas from 1952 to 1994 (Yuan).

![Graph showing per capita income in urban and rural areas from 1952 to 1994.](image)


The basic features of food consumption in China for the last four decades can be summarized as a low average consumption level with large temporal fluctuations, large disparities inter-regionally and between urban and rural areas, and low levels of energetic and nutritional contents from animal sources. Table 2.8 describes food consumption in China for selected years.
The table reveals a close association among living standards, foodgrain consumption and consumption of animal products (meats, fish, poultry and eggs).

**Table 2.8: Comparison of Per Capita Average Urban and Rural Food Consumption.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income (Yuan)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>401.5</td>
<td>440.8</td>
<td>458.4</td>
<td>607.6</td>
<td>983.4</td>
<td>1387.3</td>
<td>1520.1</td>
</tr>
<tr>
<td>Rural</td>
<td>160.1</td>
<td>170.5</td>
<td>223.4</td>
<td>355.3</td>
<td>462.6</td>
<td>629.9</td>
<td>667.2</td>
</tr>
<tr>
<td><strong>Food Expenditure Share (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>59.0</td>
<td>58.4</td>
<td>56.7</td>
<td>58.7</td>
<td>54.3</td>
<td>54.4</td>
<td>55.9</td>
</tr>
<tr>
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<td>60.5</td>
<td>59.7</td>
<td>59.9</td>
<td>55.2</td>
<td>54.6</td>
<td>55.9</td>
</tr>
<tr>
<td><strong>Food Grain consumption(kg)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>206.3</td>
<td>215.7</td>
<td>218.2</td>
<td>218.6</td>
<td>214.3</td>
<td>214.0</td>
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<tr>
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<td>231.0</td>
<td>256.5</td>
<td>259.4</td>
<td>262.1</td>
<td>264.2</td>
</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>21.42</td>
<td>33.12</td>
<td>38.16</td>
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</tr>
<tr>
<td>Rural</td>
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<td>11.95</td>
<td>15.12</td>
<td>17.01</td>
<td>17.14</td>
<td>18.95</td>
</tr>
<tr>
<td><strong>Vegetable (kg) consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>98.76</td>
<td>114.80</td>
<td>152.40</td>
<td>149.04</td>
<td>145.49</td>
<td>138.69</td>
<td>142.16</td>
</tr>
<tr>
<td>Rural</td>
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<td>93.68</td>
<td>124.00</td>
<td>140.03</td>
<td>130.42</td>
<td>134.00</td>
<td>137.83</td>
</tr>
</tbody>
</table>

Sources: *China Statistics Yearbook for Finance and Commerce, Various issues.*

Three issues should be pointed out. First, not only in urban areas but in rural areas also, a new pattern appears to have emerged since 1978 as income levels rose, with direct grain consumption stagnating or even declining in urban area (Figure 2.8) and consumption of animal
products increasing rapidly. Second, consumption of animal products has fluctuated much more
than consumption of foodgrain in urban areas after 1987. This fluctuation was more closely
associated with the increased price of animal products during this period. Third, the overall food
shares of urban and rural consumption expenditure have fallen since 1976 in China, confirming the
familiar pattern described by Engel's Law. Recently, urban and rural food shares were almost
identical, about 55 percent, despite the fact that the urban-rural income gap was more than 100
percent.¹

Figure 2.8: Per Capita Grain Consumption in Urban and Rural Areas (kg).

![Graph showing per capita grain consumption in urban and rural areas (kg).]


When we discuss grain consumption in China, three features should be addressed. First,
per capita grain consumption in urban area has decreased steadily since 1978 while per capita
grain consumption in rural area has been grown steadily since 1985 after it dramatically jumped

¹ The actual difference should be larger than 100 percent due to the high level of subsidies and welfare in kind enjoyed by urban consumers. See Ma 1992.
from 1978 to 1984. Second, although per capita grain consumption in urban areas has decreased since the early 1980s, total grain consumption in urban and rural areas has increased (Figure 2.9). Third, because of income increases, accompanied with total grain consumption growth, the demand for meat, egg and vegetable has increased in both urban and rural areas.

Figure 2.9: Total Grain Consumption in Urban and Rural Areas (million tonnes).


The World Bank (1985b) expects that from a long-term point of view, it is unlikely that China will face shortages of food grain supply for human consumption. Carter and Zhong (1989) indicate that the change in current income does not greatly change current consumption. Its full impact is spread out over succeeding years. They state that the fact that meat is a ‘luxury’ in China and the Chinese have shifted their food consumption towards more meat and will continue to move in the same direction if their incomes keep increasing. This will lead to increased demand for feed grain in the future.
It seems that at present, meat is a “luxury” in urban areas and fine grain is a “luxury” in rural areas. This means that the Chinese government will face difficulties in purchasing grain, especially fine grain, from agricultural households for the consumption in urban areas unless the procurement price for fine grain increase. Figure 2.10 shows that per capita grain purchase amount for the Chinese government has been stagnated since the early 1960s except the early 1980s. The gap between the per capita amount purchased by the government and the amount for per capita consumption has been getting narrower and narrower since the early 1980s. The fact that the percentage of procurement from total grain output has quite stagnated means that the government’s purchased amount has not met the demand for grain consumption in urban area. This may be one of the reasons for the government to import more wheat from, and stop exporting rice and reduce to export corn to, international grain markets rather than procuring it from domestic sector.

**Figure 2.10: per capita grain purchase amount and consumption in urban area.**

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**Sources:** China Statistics Yearbook, 1980-1995.
Although the Chinese grain procurement and distribution systems have been successful in providing foodgrain to most of the people in urban areas, the total grain procurement amount has stagnated since the middle 1980s. However, under the government managed grain system, the per capita grain purchased amount for urban areas has increased since 1978. Most of the grain purchased is consumed as food grain by the population in urban areas. Given the high urban population, the government-purchased amount will increase in coming years (Brown, 1994). Fine grain consumption in rural area has also increased. It is probably true that the demand for feed grain in China will increase in the future. But China’s grain imports, which are dominated by wheat imports, will increase at least by the current level, if it not more.
Chapter Three:

Grain Domestic System and Foreign Trade in China

Section 3.1: Structure Changes of Domestic Grain Market in China

The reforms in China's grain marketing system that have taken place since 1978 have contributed significantly to changes in China's grain production and trade. Before we describe the details of China's grain foreign trade, wheat in particular, it is useful to examine how China's internal grain marketing system has been reformed since 1978.

The Chinese government applied different measures to control the grain market before and after 1978. China's grain system includes three sections: a grain procurement system, a grain distribution system, and a grain foreign trade system. Since the economic reforms and decentralization of the internal grain system that have occurred since 1978, a free market in grain has emerged and has moved the previously planned grain system to a system with elements of both planned and free market systems. Figure 3.1 presents the current structure of China's grain marketing system for both internal markets and foreign trade. The section above the dashed line shows how the Chinese government controls and plans its grain marketing. The section below the dashed line shows the relationship between planned grain market and the free market, both domestic and international, Since there was no free market for grain before the reforms of 1978, the top section of the figure represents a purely planned system.
Figure 3.1: General Structure of China's Grain Marketing System.

- State Planning Commission (SPC)
  - MOFERT
  - Provincial and Municipal Governments
  - Ministries and Bureaus in Central Level
  - Bank of China
  - Banks
  - SGB
  - Central COFCO
  - Ministry of Internal Trade, MOFERT and State Grain Bureau and Their local branches
  - Subsidy Measures
  - Internal Grain Distribution System
  - Transportation
  - Internal Grain Procurement System
    - Grain Stock
      - Urban Households Consumption
      - Other Grain Users
      - Regional Grain Movement
      - Collect Storage
      - Purchase methods
      - Purchase Prices
  - Government Planned Grain Market
    - International Grain Market
    - Free Market for grain (Urban Area)
    - Non-Government Market for Grain (Rural Area)
The State Planning Commission (SPC) controls much of the grain system through several ministries and local governments. The government procures, distributes, and trades grain, as indicated by the bold squares in the middle of Figure 3.1. The Ministry of Internal Trade,¹ The State Administration of Industry and Commerce, The State General Commodity Price Bureau and the State Grain Reserve Bureau in consultation with the ministries of Finance, The Ministry of Agriculture, The People's Bank of China and other ministries are responsible for setting grain prices and for grain procurement and distribution. The setting of administered prices and arrangement for grain is subject to review and approval by the State Planning Commission (SPC).

The approved plans from SPC are then passed to Ministries and their branches in local governments. In the government grain market, local governments work with several Ministries, in particular the Ministry of Internal Trade and its local grain bureaus, to control and operate local grain procurement and distribution, following the approved plans of the central government (SPC). In practice, the Grain Reserve Bureau, which is one of the departments of the Ministry of Internal Trade, and its local branches carry out all plans for procurement and distribution. The non-government grain market (at the bottom of Figure 3.1), including the team market in Figure 3.2 (for the period before 1978) and the agricultural households market in Figure 3.3 (for the period after 1978), has produced the major part of the free market grain after 1978.

The internal grain system and the foreign grain trade system are mainly controlled by the government grain market². The government grain system completely controlled the whole state planned grain market. Before 1978, non-government grain markets were very limited and were

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¹ Before 1985, the Ministry of Internal Trade was called The Ministry of Commerce.
² Before 1978 the grain market was divided into the state grain market and the rural grain market. After 1978, the grain market is divided into three components: the state grain market, the free grain market and rural grain market.
indirectly controlled by state grain planning. After 1978, although the free grain market emerged as a domestic institute of grain marketing, the mixed grain market was still dominated by the state grain system. Additionally, the government indirectly influenced the free market for grain by its grain policies in procurement, distribution and, finally, foreign trade. Foreign trade of grain is currently strictly controlled by the central government and has not been decentralized, despite reforms in other areas.

3.1.1: China’s Grain Marketing System under Planned and Mixed Economies

Sicular (1991) states that the Chinese government uses different food pricing policies to handle the basic food grain needs for urban and rural people. Food pricing policy in China must be understood in the context of China’s socialist economic system. One important feature of this system is the substantive role of government planning. This section introduces the grain marketing system under a purely planned economy and then under a mixed economy.

**Grain Marketing System in the planned economy:** Figure 3.2 shows grain circulation in the strictly planned system that existed before 1978. The sellers to the state market included most of the state farms and the production teams (Types I and II). The state farms sold almost all of their grain product to the state, except grain for their own consumption, distribution and seed and feed storage for the following year's production. The production teams usually sold part of their grain products to meet the established targets and kept the remainder for the following year's production and internal distribution. Figure 3.2 divides circulation in the whole planned grain system under a purely planned economy and then under a mixed economy.

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3 In China, agricultural production teams are classified by their activities in the state grain market. The type I sells to but does not purchase from the state grain market. The type II both buys and sells to the state grain market. The type III sells nothing to but makes purchases from the state grain market.
system into two parts. The left and upper part is grain circulation occurring in the state market and under direct control of the government grain plan. The left and lower part is grain circulation occurring within the rural (team) market and under indirect or semidirect control of the government plan.

**Figure 3.2: Grain Circulation in the Planned Economy**

The state market: The buyers from the state grain market consist of all urban households, all state farm households, the military, some industries, and part of the production teams including Types II and III. Production teams are classified by their activities in the state market. International trade and the state stock are both used by the government to adjust and maintain the
balance of demand and supply for grain in the state market. The functions of the state stock are: (1) to ensure needs are met between harvests, (2) to protect people against natural disasters and/or plan mistakes, (3) to allow for fluctuations in the international market to avoid unnecessary loss, (4) to overcome time-lag difficulties caused by both domestic and international transportation problems, and (5) to provide for emergency needs due to abnormal situations, such as war or embargo.

**Team market:** According to government mandate, the non-government grain market is open only to agricultural households. In this market, distribution of grain is made according to the work, age and sex of the members within the household. Prices are set at state market prices (or less). The sellers in this market are teams, and the buyers are still agricultural households. Due to the distribution of population between the urban and rural areas, grain circulation in the state market has been a smaller portion of the total grain output than the grain amount circulated in the team market. For example, in 1977, the government purchased about 20 percent of the total grain output and the production teams distributed almost 80 percent of the total grain output. In the same year, the urban population comprised 15.7 percent of the total population, whereas the rural population accounted for 84.3 percent.

**Grain Marketing System in the mixed economy:** Under the mixed marketing system, there are basically three types of grain markets. The state grain market (including foreign grain trade), the rural area non-government grain market, and the urban area free grain market. The state grain market continues to be controlled by the government (the grain foreign trade market is still controlled and managed by the central government). The free market for the urban area is

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indirectly managed by the government but is open for private exchange. The government still plans both the foreign trade of grain and the state grain stocks to adjust and maintain the balance of the demand and supply for grain in the state market. The government may even purchase or sell some grain in the free market to control the level of grain prices and the state grain stocks. Figure 3.3 shows grain circulation in the Chinese mixed marketing system. The arrows in the graph indicate the flow directions of grain within the system.

**Figure 3.3: Grain circulation in the Chinese mixed economy**

The dashed line in Figure 3.3 divides the grain circulation in the Chinese mixed economy into four parts. The central part is the grain circulation occurring in the state market (including grain stock and foreign trade) and under direct control of the government plans. The other three
parts, except for the lower left corner, show the grain circulation occurring in the free market and under weakened indirect plan control. The lower left hand rectangle represents the grain circulation within the rural household market, with little government control.  

In the mixed grain economy, the state grain market has not fundamentally changed, the government sets state market prices based on its own judgment. The government still controls not only the prices but the quantities exchanged in the state market including grain free market in urban area. The state market continues to be seen as an extension of government policies. On the other hand, in the rural grain market, type I household and type II household, which still exist in the mixed system, are major grain suppliers to the state grain market. A type I household is completely self-sufficient in grain while a type II household is partially self-sufficient.

In summary, due to the shift of population distribution between urban and rural areas, grain circulation in the state market increased since the late 1970s, but still constitutes a small portion of the total grain consumption. The own-grain consumption of most of the agricultural households still accounts for a larger share of total grain consumption in the Chinese mixed economy. In 1994, the government purchased 30% of the total grain output and the agricultural households distributed almost 70% of the total grain output. In the same year, the urban population increased and comprised 31% of the total population whereas the rural population accounted for 69%. The government retailed an estimated 34 percent of the total grain consumed in China and the agricultural households sold about 5 percent of the total grain consumed to the free market in 1994. In the household market, the own grain consumption by agricultural households was estimated at 61 percent of total grain consumed in it. Agricultural households in the Chinese mixed

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5 The household market maintains in rural areas and used to agricultural household grain market before 1978.
grain economy are largely still self-sufficient and the Chinese mixed grain economy is still predominantly planned by the government.

**The free market:** In the mixed economy anyone can buy goods in the free market. Figure 3.3 shows that buyers in the free market consist of urban households, industry, state farm households, and a minority of agricultural households (Types II and III). The first three buyers have the right to buy grain from the state market at the lower prices, and they may purchase additional amounts of grain from the free market at generally higher prices. The seller in the free market is usually a Type I agricultural household.

According to the Chinese official opinion, the free market is only a supplement to the state market. The free market price is determined by the interaction of market forces (Tian Jiyun, 1989). However, the quantity exchanged in the free grain market is partly determined by price and is partly determined by the government policies. Grain demand and supply in the free market is only a residual grain demand and supply of the sum of grain demands and supplies in both the household market and the state market. Thus, the government uses its power to control the quantities exchanged in the state market and to indirectly control the quantities exchanged in the free market. We should not overestimate the importance of the free market in such a mixed economy. Although the Chinese government lacks power to set the prices in the international market, it has fully monopolizing power to decide the varieties and quantities imported and exported.

It is clear that China’s grain consumption continues to be (more or less) under the central planned system despite the limited marketing mechanism in grain since 1978. It should be
reiterated that both before 1978 and after 1978, China's foreign trade in grain has totally been under complete central government control. The international grain markets are still partially an extension of government policies. We will discuss this in detail in Chapter three.

3.1.2: Grain Procurement System Reform.

Mao Zedong once said, "planned purchase and planned marketing are important steps towards implementing socialism" (People's Daily Oct 23rd, 1952). In the early 1950s, the Chinese government eliminated the use of existing grain markets and instituted a scheme of central grain purchase and supply. This grain purchase and supply system was called the "unified procurement system" and it required farmers to sell their excess grain to state procurement stations at fixed prices (Donnithorne, 1967). The State Grain Bureau procured, stored, transported, milled, and sold grain to urban residents and government employees at relatively low fixed prices. This system soon became a key element of the country's pre-reform development strategy which aimed at extracting agricultural surplus to finance a rapid process of industrialization. By this procurement system, the government purchased certain amounts of grain from farmers to ensure the grain consumption in urban areas and other sectors, in order to achieve its grain self-sufficiency policy.

The procurement system that was actually implemented, however, was more complicated than indicated by the strict definition of "Unified Procurement", under which any grain output produced by the farmers, whether above the official quota or not, was to be sold to the state at one, fixed, and presumably depressed, price. Even before the reform was launched in 1978, apart

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6 Mao Zedong was President and Chairman of CCP between 1949 and 1976. He was well known as "Chairman Mao".
from quota-procurement, the Chinese government also undertook above-quota purchase and negotiated procurement, largely as incentive measures to encourage extra-quota production. The importance of above-quota purchase has been recognized in the existing literature (Barker et al, 1982; Sicular, 1985; Stone, 1984; World Bank, 1986). However, the role of negotiated purchase, which was basically a kind of voluntary transaction between the state and the farmers, has gained recognition only since 1978. One of the reasons for the increased attention was its rising importance in the actual grain marketing system (Sicular, 1988). For instance, a report by the World Bank notes that state procurement of grain at negotiated price increased rapidly in the 1980s, from less than 15% of total state procurement in 1980 to 35% in 1987. The ratio shot up to more than 40% in the early 1990s (World Bank, 1995). The changes in the early 1980s were particularly important. The Chinese government decided to abolish the unified procurement system and replace it with the "contract procurement system". Under the new system, farmers were supposed to sign transaction contracts with the state voluntarily. At the same time, the authorities chose to increase the amount of "negotiated purchase" substantially. By this method, the government effectively and indirectly controlled non-government grain market.

Figure 3.4 shows China's grain output, government purchase amount and the procurement percentage out of total grain output over time. The main feature of this graph is that the difference between grain output and the procurement percentage has been increasing from the 1960s due to large increases in grain output. This gap suggests that if China does not again change its grain procurement system, even though there have been many changes already undertaken, it will be difficult to purchase enough grain to ensure the consumption in urban areas because population growth urban area is higher than the growth in grain output.
Figure 3.4: Grain procurement amount and its percentage from 1952 to 1994.

Section 3.2: Grain Foreign Trade Policy and System Reform.

China’s grain trade is not only a significant component in balancing domestic grain supply and demand but also an integral part of China’s internal grain marketing system and foreign trade policy. In order to understand the role played by grain foreign trade in China, it is helpful to first understand China’s central planning system in grain trade sector. From the early 1950s to the late 1970, the trade system was strictly plan directed, however, from the late 1970s onward this was gradually displaced by a more market determined pattern of trade.

China’s grain foreign trade system can be divided into two segments. Before 1978, the entire grain system was controlled by a planned grain economy, therefore, as an integral part of the internal grain system, grain foreign trade was also controlled by a state planned trade system. Since the late 1970s, the Chinese government has decentralized its grain trade system between MOFERT and local governments, but the major grain foreign trade has not been decentralized as much as the internal grain sector has been. However, market mechanism has been introduced into this system. Before 1978, the entire grain system including grain trade was controlled by a planned grain economy. Since the late 1970s, the Chinese government has decentralized its grain trade system, but the major grain foreign trade has not been decentralized as much as the internal grain sector has been.

The Planned Trade System: In China, before 1978 the government totally controlled and planned foreign trade to achieve not only economic but also political objectives (Johnson, 1990). Figure 3.5 presents the framework of the Chinese centrally planned and controlled foreign trade system.
Before 1978, the state government had a monopoly on the management of foreign trade, including grain foreign trade. With the guidance of the State Planning Commission (SPC), the Ministry of Foreign Trade (MOFERT) made annual, as well as more medium-term, foreign trade plans. The plans were implemented by several national foreign trade corporations (FTC) through their subordinate local foreign trade bureaus, and then in exchange activities in the international markets. Among the several national foreign trade corporations, the China National Cereals, Oils, and Foodstuffs Import and Export Corporation (COFCO), and its branches in local governments specialized in the trading of grain and other foodstuffs. However, those branches can not directly
be engaged in foreign trade, they function as bridges between Ministry of Foreign Trade, national FTC and local governments with plans and coordination.

Every year, based on ministry’s and local government’s trade demand, the State Planning Commission made its foreign grain trade plan, which states its revenues and expenditures, imposed import and export quotas for each province/city, and expected targets in quantities of goods to be imported and exported. In the international market, one main concern for the State Planning Commission was the external balance, which was the budget in foreign exchange. To pay for its imports, the Chinese government has to collect foreign currency from its export earnings and/or its foreign exchange reserves and foreign loans because the Chinese currency is not internationally convertible.

The MOFERT must implement the plan from the SPC and make possible increases in its exports to guarantee its ability to purchase the desired foreign goods. The branches of FTC under each local government must carry out the duties of collecting goods for export and distributing goods from import according to MOFERT’s plan. The internal balance was not so important for the MOFERT in a planned economy because its profits had to be turned over to the State Treasurer and its losses were covered by the State Treasurer. The MOFERT was concerned with the balance of domestic demand and supply for some important goods, as identified by the government. For goods which met basic needs, such as grains, the MOFERT must maintain the planned balance (rather than the real balance) in the domestic state market (rather than the combined market) (Jianguo Li, 1992).

The Mixed Foreign System: Although the decentralization of foreign trade has been carried out for more than 15 years, Chinese government and its planners still hold firmly the right of grain
The main difference from the planned trading system is that the government now divides its foreign trade plan into "mandatory" and "guidance" portions. In the mandatory portion, import and export plans are specified in quantitative terms and are usually the responsibility of MOFERT.
and its foreign trade companies. Wheat imports quantities are set as first priority in plans and must be centrally planned and controlled planned. In the "guidance", planned imports and exports are generally specified in value terms, giving local trading companies more flexibility to import and export other grains. This allows them to take marketing factors into account when determining the precise mix of imported and exported products within each category.¹

The Chinese government has decentralized the foreign trade management system horizontally (centrally) to several ministries other than the MOFERT and vertically (locally) to provincial governments (Figure 3.6), in an attempt to provide flexibility and improve the efficiency of MOFERT’s planning. At the ministerial level, the government authorizes the establishment of several new export and import companies under the guidance of several production ministries to conduct foreign trade directly. These include the Chinese. The major duty of CNSIEC is to improve grain production, not to import foodgrain. At the provincial level, the Chinese government granted authority to the governments of several provinces and cities to organize local foreign trade companies and gave local governments more authority over MOFERT’s branches. These branches are authorized to directly operate agricultural product (but not major grain) foreign trade and must report their plans and budgets to their national foreign trade corporations and MOFERT. This allows ministries and local governments to obtain a share of China’s foreign trade in international markets. In Figure 3.6, the dashed lines from Bank of China to local governments and from Bank of China to the ministries indicate that local governments and ministries have their own foreign currency accounts with the Bank of China. They can deposit

¹ However, a complete list of the above-mentioned import and export groups has never been released to foreign countries. Only partial lists have been published in the newspapers.
their foreign currency balance into their accounts after they export goods and they do not need to apply for foreign currency quota each time they import goods.

Under this decentralized system, MOFERT remains concerned with its external balance (its budget in the foreign exchange). Although loss can still be covered by the State Treasurer, it now pays considerable attention to its internal balance (its budget in domestic currency). MOFERT does this because the State Council and State Planning Commission set the profit target in the domestic currency for MOFERT and rewards an income bonus as a money incentive to MOFERT staff members if it achieves or exceeds the profit target (Mei Zhu, 1992). The other concern for the MOFERT, the planned balance (rather than the real balance) of domestic demand and supply in the state market (rather than the combined market), is unchanged from the planned economy. In a mixed economy MOFERT acts as a price taker when it purchases grain from the foreign market and acts as a price follower when it sells grain to foreign markets.

Before the economic reforms, China’s trade sector was relatively closed, oriented toward imports of advanced technology and balanced from period to period. Because of the isolation of the domestic sector from foreign trade, there was no economic linkage either between producers and exports or between domestic dealers and imports. After economic reform, both imports and exports increased at an accelerated rate. The imports are still oriented toward imports of advanced technology while foreign trade imbalance started from the early 1980s and continued to 1994. One of the factors of the trade imbalance is change of the foreign exchange rate between Chinese currency and the US dollars.

Just as international prices had only the most modest influence on Chinese decisions regarding imports and exports, the price of foreign exchange had little effect on the volume of
either imports or exports in the pre-reform era (Lardy, 1992). Thus, as in other centrally planned economies, the exchange rate was a largely passive policy instrument (van Brabant, 1985). In the pre-reform era, China's domestic currency was highly over-valued and the resulting excess demand for foreign exchange was handled through a rigid system of exchange control. The domestic currency cost of earning foreign exchange was persistently higher than the official exchange rate, making most exports financially unprofitable (Howe, 1984). The ministry of foreign trade reallocated the profits that were made by some foreign trade corporations on their sale of imports on the domestic market to offset or compensate for the losses incurred by other foreign trade corporations on their sale of export goods. In practice this meant that the effective exchange rate varied from corporation to corporation and sometimes even on a product-by-product basis. This phenomenon, which has been called the "price-equalization mechanism," was common in centrally planned economies. Unfortunately, compensating for the divergence between domestic and foreign prices undermined the incentive for trading companies to exploit comparative advantage trade opportunities (van Brabant, 1985).

Reforms of the exchange rate and relaxation of exchange controls were among the most dramatic changes in China during the last 15 years. As shown in Figure 3.7, the Chinese authorities devalued the Chinese currency Renminbi from a rate that averaged 1.25 Yuan per US dollar in the 1960s to 1.65 Yuan per US dollar in the 1970s, 2.91 Yuan per US dollar in the 1980s, and 8.73 Yuan per US dollar in 1994. Since the mid 1980s the exchange rate between the US dollar and the Renminbi has been changed according to the Ministry of Finance and the Bank

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of China. Annual accounts both in terms of foreign exchange and domestic currency were drawn by the trade administrative system and companies following the general principle of trying to balance the value of imports and exports. Since most agricultural products were undervalued in domestic markets, the trade surplus (in terms of domestic currency) made by companies had to be submitted as revenue to the state treasury. At the beginning of the 1980s, the revenue from exporting agricultural products amounted to more than 200 million yuan per annum. For products, especially manufactured goods which were overvalued, the deficit over the planned target (also in domestic currency) had to be declared at the end of the financial year and then filled by the state exchequer.

Figure 3.7: The Exchange Rate between Chinese Yuan and US Dollar, 1960-1994.

Yuan ¥/US $


Section 3.3: China’s Grain Foreign Trade

China’s grain trade is significant in balancing domestic grain supply and demand. Although there are many products involved in China’s foodgrain trade, grain products, especially wheat has consistently been most important food import while rice, until 1990, was the most important nation's food export. Figure 3.8 gives a general view of the relationship between China’s grain output and its grain trade. It is obvious that China became a net grain importer in the early 1960s and its grain imports has been increasing since 1978. Also the grain imports take a significant percentage of China’s total grain output, especially after 1978.

Figure 3.8: China’s Grain Output and Import and Export (million tonnes).

Source: USDA Foreign Agricultural Services. MOFERT: Foreign Trade Summary and Information.
3.3.1: The Trend of China's Grain Trade.

Table 3.1 shows the total grain imports and exports for selected periods. Although China moved from being a net grain exporter to a net grain importer at the beginning of the 1960s, the period between 1950 and 1994 can be divided into three phases. The first period is the 1950s. During this period, China exported 22.3 million tonnes grain products with a total net export of 21.5 million tonnes (Table 3.1). This changed the Chinese trade position from being a net importer for several decades to being a net exporter. Because this study is concerned with the period after the 1950s, this first period is used only as a reference.

Table 3.1: China's Total Grain Export and Import in Selected Periods (million tonnes).

<table>
<thead>
<tr>
<th>Year</th>
<th>Grain Export</th>
<th>Grain Import</th>
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</tr>
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<td></td>
<td>Total</td>
<td>Rice</td>
<td>%</td>
</tr>
<tr>
<td>1950-59</td>
<td>22.29</td>
<td>7.55</td>
<td>33.87</td>
</tr>
<tr>
<td>1960-69</td>
<td>21.58</td>
<td>10.33</td>
<td>47.87</td>
</tr>
<tr>
<td>1970-79</td>
<td>24.98</td>
<td>14.73</td>
<td>58.97</td>
</tr>
<tr>
<td>1980-89</td>
<td>41.94</td>
<td>8.61</td>
<td>20.53</td>
</tr>
<tr>
<td>1990-94</td>
<td>8.90</td>
<td>1.05</td>
<td>11.80</td>
</tr>
<tr>
<td>1961-77</td>
<td>43.03</td>
<td>22.57</td>
<td>52.54</td>
</tr>
<tr>
<td>1978-94</td>
<td>54.37</td>
<td>12.15</td>
<td>22.35</td>
</tr>
</tbody>
</table>


1 For comparison, 1961-1977 and 1978-1994 respectively covers 17 years and 1978 is the year the Economic Reform started.
The second phase starts with the beginning of 1960s. Due to the drastic reduction in domestic production at this time that resulted from three years of severe natural calamities and the man-made chaos of the Great-Leap Forward, China shifted back to being a net grain importer in 1961. During the 1960s, 50 million tones of grain were imported with the net import of 28 million tones. This was an important factor in alleviating the damage caused by the big famine in the early 1960s. The trend of net imports continued despite the government’s efforts to achieve grain self-sufficiency in the first half of the 1970s.

The last phase which starts in 1978 is characterized by an unprecedented record of net grain imports. From 1978 to 1994, net imports registered 167 million tones, with an average net imports of more than 10 million tones per annum despite the unprecedented annual growth rate of 4.9% in domestic grain production achieved during the same period.

One prominent feature of China's grain trade in the third period is the fluctuations in both grain imports and grain exports. "This fluctuation in China's grain trade position can be attributed to significant policy changes after 1978" (Carter and Zhong, 1989; p125). Since 1978, China's grain imports has reached the highest with more than 15 million tonnes in 1982. In 1986, it recorded the lowest with less than 7 million tonnes and then it again increased to more 15 million tonnes in 1989. During this period, grain export marked a lowest point at 0.6 million tonnes in 1984 and then jumped rapidly to 11.7 million tonnes in 1985. After 1989, grain export gradually decreased to less than 3 million tonnes. The fluctuations during this period mainly due to two factors.
Until the late 1970s China's grain supply and demand was very tightly balanced; more grains were imported to improve grain supply conditions and release high domestic pressures. Therefore, grain exports were reduced from 1.9 million tonnes in 1978 to 1.3 million tonnes in 1982 and to 0.12 million tonnes in 1994. During the same period, grain imports were sharply increased from 8.8 million tonnes in 1978 to the record level of 16.1 million in 1982 and then to 14.1 in 1994. Furthermore, the new grain production system and marketing policy started in 1978 boosted domestic grain production. The significant improvement in domestic grain availability and the successive bumper harvests achieved during the late 1970s temporarily changed the nation's trade position from being a significant net grain importer in the late 1970s to a balanced grain trade with even slight net exports in the mid 1980s. This shift in China's grain trade led the Chinese government and some foreigners to believe China's new grain policy had met China's grain self-sufficiency goal. However, in 1987, China's wheat imports jumped to about 13 million tonnes from around 6 million tonnes in 1986. China once again a net grain importer. Since 1987 China has kept its wheat imports around 13 million tonnes.  

### 3.3.2: China's Grain Export

One major characteristics of China's grain exports is the changes between 1960 and 1994 in the components of total exports. China's grain exports have been traditionally comprised rice and soybeans while grain imports have traditionally been dominated by wheat. Since the economic reform, the pattern of grain imports and exports has also experienced a profound change.

---

2 In 1987, Carter et al predicted that "it is unlikely that China can sustain the rate of increase in production experienced in the period 1980-1985 over the long run. Further rapid growth in income resulting from economic liberalization will expand demand for meat-and therefore feedgrain import".
The most salient change has been in the balance of composition of grain exports. In the 1950s, rice and soybeans accounted for 80% of China's grain exports, 74% in the 1960s, 72% for 1970-1977, 65% during 1978-1985, and 48% for the period of 1986-1994. During the period of 1960-1977, rice exports occupied 53% of total grain exports while during the period of between 1978 and 1994, rice exports drops to 22% of total grain exports. Rice exports dropped not only in percentage term but also in total quantity. After 1980, soybeans and corn became the major components of China's grain exports. During the period from 1985 to 1992, soybeans and corn accounted for almost 90% of China's total grain exports. However, after 1992, soybean export decreased dramatically and at the beginning of 1996 Chinese government announced that soybean exports would be banned.  

Figure 3.9: China's Corn Export from 1960 to 1994 (million mt).

![Graph showing corn export from 1960 to 1994.]

Source: FAO, Trade Book. MOFERT, China's Foreign Trade Issues and Strategies.

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One issue to be noted is the growth of China's corn imports during the 1970s and the early 1980s. During the period between 1982 and 1986, China reduced its wheat imports and started increased its imports of corn (Figure 3.9). At this time many grain economists predicted that this trend of importing more feed grain instead of wheat would be continue into the next century (World Bank, 1985; Carter and Zhong, 1989; McCalla, Carter, Schmitz, 1989). However, after 1984 China's corn imports fell significantly, by 1985 china was exporting corn. In 1985, corn exports accounted for 67% of total grain exports. From 1985 to 1990, China exported an average of 3 million tones per year. However, corn exports suddenly jumped to 10 million tones in 1993. After 1994 corn exports declined, and at the beginning of 1996, the Chinese government announced it would continue to reduce corn exports because of an increase in domestic demand.
Section 3.4: China's Wheat Imports

Wheat plays a major role in China’s grain economy. It accounts for over 30 per cent of total area sown to grain and about 25 per cent of China’s total grain production. China began to import large quantities of wheat in the early 1960s. Since then wheat has always been a major component in China’s grain imports. Wheat imports made up 90% of the total grain imports in the 1960s, about 85% since the 1970s, more than 90% in the 1980s, and more than 95% in the first half of the 1990s. Wheat imports was the most important import commodity during both study periods, despite the fact that domestic wheat production registered an annual growth rate of 8.5% during the period between 1978 and 1994. Figure 3.4 reveals China’s wheat imports.

Figure 3.10: China’s Wheat Import from 1960 to 1994 (million tonnes).

Sources: data is based on World Wheat Statistics, IWC. Statistics information of Grain import and export, Grain Bureau, SPC.
Wheat imports into China are subject to substantial year-to-year fluctuations that depend on both domestic and international factors. Figure 3.10 shows that China’s wheat imports fluctuated substantially during the study periods while Figure 3.11 presents the relationship between China’s wheat import, production and consumption. The striking move is its wheat import sharply jumped from about 2 million tones in 1976 to almost 14 million tones in 1981 and then fell rapidly to about 6 million tones in 1985. In 1987, wheat imports steeply risen again to more than 14 million tones and then stayed around 14 million tones to the early 1990s. Although the general trend of China’s wheat imports has been upward, the large fluctuations in the second period have been a controversial topic in grain researchers. The center issue is why this fluctuation happens and what is the main cause for these fluctuations.

**Figure 3.11: China’s Wheat Production, Consumption and Import (Million tonnes).**

Unlike other major wheat importing countries such as Japan and the former Soviet Union, China imports wheat primarily for direct human consumption, especially for the population in the urban areas. Wheat is the staple food in the northern part of China, and is being consumed in increasing quantities in the southern part of the country. Wheat in China is basically consumed in the form of noodles, dumplings, steamed bread, and other steamed products. Domestic demand for wheat has steadily out-paced supplies thereby making China a major grain importer since the early 1960s. From the early 1960s to the mid 1990s, wheat imports averaged about 10 per cent of total annual wheat consumption in China. Most of the imported wheat goes to flour mills in big cities where it gets blended with domestically produced wheat to produce better quality flour for urban residents.

China is among the leading countries in the world in per capita consumption of wheat. According to the International Wheat Council (IWC), China's 1993 per capita use of wheat for food purposes was estimated at 86 kg, the highest in Far East Asia and almost equal to the North American consumption of 87 kg per capita. Increase in disposable incomes in China are causing shifts in dietary pattern; as incomes of people in rural areas increase, there is a tendency to switch from rice and/or coarse grains toward wheat and wheat-based products while in urban areas, increase in incomes lead to increased consumption of fruits, vegetables, meat, and meat-based products as well as increased demand fro western-type products such as bread, crackers, biscuits, pastries, cookies, convenience, and snack foods.

Figure 3.12 presents that the principal sources of China's wheat imports have been Canada, United States and Australia. Canada and Australia have been two of the most important and largest exporters of wheat to China since the early 1960s. Most of the grain marketing in these
countries is done by public bodies, in particular the Australian Wheat Board (AWB) and the Canadian Wheat Board (CWB). Also they do differ from each other in some aspects, as quasi-government they are able to conduct government-to-government sales, and to arrange official credit. In the last 30 years, Canada’s market share in China’s wheat market has ranged between 20 and 100 percent while Australia’s share has ranged from 0 to 40 percent.

**Figure 3.12: China’s Major Wheat Exporters and Their Volumes (1,000 mt).**

![Wheat export volumes graph](image)

Sources: data is based on *World Wheat Statistics*, IWC. *Statistics information of Grain import and export*, Grain Bureau, SPC.

The United State started to export wheat to China after it established the diplomatic relation with China in the early 1970s. During the 1980s, the United States replaced Canada as the largest wheat exporter to China, although the amount of US wheat exports has also fluctuated from year to year. Under the new foreign trade system in China, the relationship between China and the US is not the key concern when deciding where to buy wheat (Guofeng Li, 1994) For
example, after the “Tian An Men Square Massacre” in 1989, the United States suspended its official relationship with China. Nonetheless, wheat imports from the US were the highest of any period from 1989 to 1991.

Fore wheat import availability and security, the Chinese government maintains several suppliers including Argentina and France. However, these countries have exported only marginal amounts of wheat to China since the early 1960s.

By the year 2000 and 2004, China’s economy is projected to grow at about eight and seven per cent respectively. Since domestic production is not expected to expand significantly and consumption is expected to increase, China’s wheat imports are projected to grow. Canada and the United States are each expected to maintain a share of about 40 per cent of China’s wheat market. Australia, Argentina and France will share the remaining 20 percent of wheat exports to the Chinese market.

It is expected that wheat quality and price considerations will become increasingly important to the Chinese government. This expectation is based on the assumption that consumers will demand higher quality wheat-based products as their incomes continue to rise. Import prices will also have more influence on purchasing decisions than before, as a result of the market-oriented reform.

China comprises 20 percent of the world’s population but only less than 10 per cent of its arable land. The potential for increased production is thus limited, especially in the long-term. Furthermore, transportation and logistics in China make it less expensive to import grain for coastal areas than to move it from China’s producing areas. The quantity of wheat imported by
China in the future will mostly be a function of several determinants including domestic production, grain consumption, world prices, and government policies. However, uncertainties about yield improvements, foreign-exchange earnings, market liberalization, and self-sufficiency policies, all imply a wide range of possible production, consumption, and therefore, import scenarios.
Chapter Four:

Major Features of International Wheat Market.

In today's world, grains, as foodstuffs, not only meet essential human needs but also have an economic and political importance by virtue of accounting for a large amount of trade. It is perhaps not surprising that governments have frequently sought a degree of involvement in grain production and trade. Wheat has not escaped this governmental embrace for decades.

Section 4.1: World Wheat Production.

Figure 4.1 and Table 4.1 reveal the world situation of wheat planning area, production, consumption and the growth of world wheat production from the early 1960s to the mid 1990s.

Figure 4.1: World Wheat Area, Production and Consumption (million tonnes/hectares).

Sources: Based on data from International Wheat Council, and USDA, Foreign Agricultural Services.
Figure 4.1 plots world wheat area and production data and has a number of important features. The overall pattern is that world wheat production has grown steadily and quite quickly in the recent years, but that this production growth has increasingly become dependent on increments in yields rather than areas, and that production instability has become more pronounced.

**Table 4.1: Growth rates of world wheat production, 1960-1994.**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Wheat</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developed Countries</td>
<td>2.9</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>4.9</td>
<td>4.7</td>
<td>4.8</td>
</tr>
<tr>
<td>World</td>
<td>3.1</td>
<td>2.8</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Coarse grains</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developed Countries</td>
<td>2.4</td>
<td>1.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>2.6</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>World</td>
<td>2.6</td>
<td>1.8</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Sources: International Wheat Council and USDA.

First, the growth in wheat production more than doubled in less than 35 years from 240 million tonnes in 1960 to more than 570 million tonnes in 1994. The world wheat production has grown at an annual average rate of 3.3% from 1960 to 1994 while grain production has grown at an annual average rate of almost 3.0% over the same period. This is, by historical standards, a rapid growth rate.\(^2\) However, one interesting feature of the data is the lack of uniformity in the growth in wheat production. Output in developing countries has grown more rapidly than in the developed countries. (Table 4.1) Growth has particularly rapid in Asia: annual average growth

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\(^1\) Note: Growth rates are least squares trend growth rates. Source: Computed from data of the Economic Research Service (ERS), USDA.

\(^2\) Over the entire period 1883-1939, world production of wheat grew at an average annual rate of only 1.3% Computed from data in Malenbaum, *The world wheat economy 1885-1939*. 

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rates of wheat production for the period 1961 to 1994 were 6.0% in Asia as a whole, 6.4% for India and 6.8% for China.

Figure 4.2 presents data on wheat production over the last 35 years. The countries selected are the world's largest producers, plus Canada and Australia, whose production isn't large but who are significant exporters to China, and whose production therefore is of importance to the world market as well as to China. The former Soviet Union was the largest wheat producer for many years, but its position has, in recent years, been replaced by China, whose production virtually fivefold in the last 35 years from 22 million tonnes in 1960/61 to 105 million tonnes in 1993/1994.

**Figure 4.2: World Wheat Production in Major Countries (million tonnes).**

![Graph showing world wheat production]

Sources: International Wheat Council and USDA.

Second, it is also apparent in Figure 4.3 that not all producers have participated equally in the growth of production. Production in the USA has been erratic with fluctuations. During
1989/90 and 1990/91, wheat production jumped to almost 75 million tonnes from 55 million tonnes. It clearly has not shown an upward trend recently. Australia's production has been extremely unstable. For example, in 1982/1983, Australia produced only 8.7 million tonnes, but the following year output was 22 million. In percentage terms, these are the most remarkable production swing of the entire decade, but many other producers have faced similar problems.

Third, the production of wheat has been much less volatile than production of grain as a whole. Although wheat harvested area has been declining since the early 1980s, and there were variations from region to region and from year to year. Because of fluctuations in the weather and differences in the productivity of soil, the growth in wheat output, therefore, had to come from increases in the area cultivated. In the more recent period most of the increase in production has come through increase in yield. According to one study of the growth in wheat production over the period 1960 to 1990, 74% of that growth came from increases in yields (Tyers and Anderson, 1992). In fact, over the past 35 years, it is yields that have become the key variable in determining production. Figure 4.3 shows yield data provides more insights into what is behind this pattern of production variability.

Figure 4.3 shows the importance of yields and there are three distinctive features. First, there is the steady increase in world yields, from 1.06 tonnes per hectare in 1960/61 to 2.53 in 1993/94. Most individual producers also show an increase, and it is particularly marked in China. Second, there are a great deal of variability in yields among the major wheat producers, and these variability have two aspects.

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3 There was a growth in area cultivated, it occurred in the 1960s and early 1970s. Since the late 1970s, the area of wheat harvested has fluctuated around a stable level.
On the one hand, there is a pronounced difference between yields in different countries: wheat yields in US in 1970/71, for example, were highest among other producers but since 1982 China has been the country with the highest yields. On the other hand, there is variation within one country from one year to the next. US, Australia and Canada are the countries with large yield variations and steady growth in the last 35 years. Only in China have yields been rapidly climbing since 1970s, especially since the early 1980s. Third, there are two interrelated reasons for the variability. Clearly, the weather is very important, and one can not explain Australia yields, for example, without reference to droughts. Canada and US are both exposed to extreme climates that can produce good crops one year and bad crops the next. The second reason, however, is
agricultural policy. It certainly is not favorable weather that has made the EC such a productive wheat grower, nor can weather explain the growth in yields in China.

Section 4.2: World Wheat Consumption

Figure 4.4 shows the trend of world wheat consumption. World wheat consumption has grown from 325 million tonnes in 1960 to 560 million tonnes in 1994. Over the period 1961-1990, world wheat consumption grew at an annual average rate of 3.8%. Consumption in industrial countries grew at 1.6% per annum while consumption in developing countries was 4.8% (Jianguo Wang, 1982). Wheat consumption in the developing countries rose from 129 million in 1970 to 386 million in 1994, more than tripling. Table 4.2 provides summary of world wheat consumption. Consumption in developing Asian countries, the developing world's most populous continent, increased from 81 million tonnes to in 1970 to 249 million tonnes in 1994, a much larger rise than in the rest of the developing world.

Table 4.2: Summary of World Wheat Consumption (Million tonnes).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Countries</td>
<td>83.5</td>
<td>98.67</td>
<td>103.0</td>
<td>107.2</td>
</tr>
<tr>
<td>Developing Countries</td>
<td>129.0</td>
<td>248.96</td>
<td>290.9</td>
<td>386.3</td>
</tr>
<tr>
<td>Asia</td>
<td>81.2</td>
<td>173.98</td>
<td>207.5</td>
<td>249.1</td>
</tr>
<tr>
<td>World</td>
<td>333.7</td>
<td>460.1</td>
<td>536.8</td>
<td>562.2</td>
</tr>
</tbody>
</table>

Sources: *International Wheat Council and USDA.*

Figure 4.4 shows that world wheat consumption is comparatively stable growth from the 1960s to the middle 1990s. Wheat production can vary considerably from one year to the next, but

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4 See appendix Table 8, Wheat Yields for Major Producers from 1960 to 1994.
5 Excluding Japan.
6 If we takes an even longer perspective, we will find a similar result.
it is normally the case that these fluctuations are absorbed by stocks rather than consumption.\footnote{That is true at the global level, however, is not necessarily true at the level of individual countries.} Table 4.3 presents shorter period of data for some individual countries that are important consumers of wheat. For many years, the Soviet Union was the world's most important wheat consumer, but, as seen with wheat production, its position has recently come under threat from China and China has now established itself as the leading consumer.

Second, the pattern of wheat consumption at the world level simply reflects the dependence of wheat demand on population growth. This is even clearer if we look at individual countries. In China, for example, wheat consumption increased from 34 million tonnes in 1970 to 100 million tonnes in 1989, an annual average increase of more than 7%. Over the longer period 1961-1992, Chinese consumption grew 6.5%. Similarly, Indian consumption grew by 4.8% per annum over this period, and the rate in Pakistan was 3.9%. Contrast this with EC's 1.2%, Japan's 1/4% and an industrial country average of 1.6% (Cramer and Wailes, 1993).

**Table 4.3: World Wheat Consumption by Major Countries (million tonnes).**

<table>
<thead>
<tr>
<th></th>
<th>80/81</th>
<th>81/82</th>
<th>82/83</th>
<th>83/84</th>
<th>84/85</th>
<th>85/86</th>
<th>86/87</th>
<th>87/88</th>
<th>88/89</th>
<th>89/90</th>
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<tbody>
<tr>
<td>USA</td>
<td>21.3</td>
<td>23.1</td>
<td>24.7</td>
<td>30.2</td>
<td>31.3</td>
<td>28.6</td>
<td>32.5</td>
<td>29.5</td>
<td>26.5</td>
<td>27.0</td>
</tr>
<tr>
<td>EC-12</td>
<td>49.4</td>
<td>49.6</td>
<td>50.2</td>
<td>56.0</td>
<td>60.1</td>
<td>59.2</td>
<td>56.7</td>
<td>58.2</td>
<td>59.5</td>
<td>58.1</td>
</tr>
<tr>
<td>USSR</td>
<td>112.6</td>
<td>104.9</td>
<td>100.6</td>
<td>93.0</td>
<td>91.2</td>
<td>91.6</td>
<td>102.8</td>
<td>101.5</td>
<td>100.4</td>
<td>103.3</td>
</tr>
<tr>
<td>Turkey</td>
<td>12.8</td>
<td>13.4</td>
<td>13.6</td>
<td>13.7</td>
<td>13.6</td>
<td>13.7</td>
<td>14.0</td>
<td>14.0</td>
<td>14.1</td>
<td>15.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>7.5</td>
<td>7.7</td>
<td>7.6</td>
<td>7.9</td>
<td>8.0</td>
<td>8.2</td>
<td>8.3</td>
<td>8.8</td>
<td>9.8</td>
<td>10.2</td>
</tr>
<tr>
<td>China</td>
<td>75.9</td>
<td>78.8</td>
<td>79.4</td>
<td>82.9</td>
<td>92.2</td>
<td>100.4</td>
<td>101.5</td>
<td>102.8</td>
<td>104.4</td>
<td>104.5</td>
</tr>
<tr>
<td>India</td>
<td>34.3</td>
<td>36.3</td>
<td>37.8</td>
<td>42.0</td>
<td>43.1</td>
<td>43.7</td>
<td>45.5</td>
<td>49.8</td>
<td>51.2</td>
<td>52.5</td>
</tr>
<tr>
<td>Pakistan</td>
<td>11.2</td>
<td>11.2</td>
<td>11.5</td>
<td>12.0</td>
<td>12.3</td>
<td>12.7</td>
<td>13.2</td>
<td>13.8</td>
<td>14.9</td>
<td>15.6</td>
</tr>
<tr>
<td>World</td>
<td>450.9</td>
<td>449.4</td>
<td>460.1</td>
<td>474.0</td>
<td>492.9</td>
<td>496.2</td>
<td>522.4</td>
<td>531.1</td>
<td>532.4</td>
<td>536.8</td>
</tr>
</tbody>
</table>

Sources: International Wheat Council and USDA.
Third, the different rates of population growth in the developed and developing worlds can not wholly explain the pattern of wheat consumption. In part, these gains in consumption are the result of economic gains by developing nations. It is interesting to note that the greatest gains have come in Asia, one of the continents with very large numbers people and rapidly growing economy. The capacity for poor people to increase their consumption of basic foodstuffs, such as bread, is considerable. It is in these circumstances that the earlier statement that rising incomes do not lead to increased wheat consumption obviously does not apply; and of course it is these consumption rises that are reflected in the high elasticity of demand for wheat seen in Table 4.4. China has also recorded impressive rates of economic growth since the late 1970s, boosting consumer incomes and therefore allowing consumers to satisfy some of their spent up demand for grain.

Table 4.4: Income elasticity of demand for wheat and coarse grains in selected countries.

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
<th>Coarse Grains</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>-0.2</td>
<td>0.04</td>
</tr>
<tr>
<td>EC</td>
<td>-0.37</td>
<td>0.04</td>
</tr>
<tr>
<td>Canada</td>
<td>-0.24</td>
<td>0.04</td>
</tr>
<tr>
<td>USSR</td>
<td>-0.42</td>
<td>0.10</td>
</tr>
<tr>
<td>India</td>
<td>1.06</td>
<td>2.13</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.62</td>
<td>1.50</td>
</tr>
<tr>
<td>China</td>
<td>0.75</td>
<td>1.69</td>
</tr>
</tbody>
</table>


Table 4.4 presents the income elasticity of wheat and coarse grains for some countries. The income elasticities of coarse grains are higher in most countries. This table also shows the pronounced difference between developed and developing countries. Income elasticities of demand for wheat are very much higher in developing countries; but they are negative in
developed counties. The elasticities of demand for coarse grains are even higher still in developing countries. In China, the elasticity is 1.69, meaning that a 1% rise in income causes a 1.69% rise in the demand for coarse grains. The numbers are similarly high in other poor countries. This is no more than a reflection of the desire of people to eat more meat as soon as their incomes permit. In developed countries, both types of grain are price inelastic, but since wheat is more of a staple and coarse grains more of a luxury item, the price elasticity of wheat tends to be greater than that for coarse grains.

**Section 4.3: World Wheat Trade.**

World grain trade is only a small proportion of total production. Total exports of wheat amount is less than a quarter of world production, and exports of coarse grains fluctuate between 12% and 15% of production. The volume and the value of world trade in grains is huge in relation to other agricultural commodities.

Grain economists often categorize world wheat importers as three types. Figure 4.5 reveals the world's major wheat importers. Among these importers, at one extreme there are countries that are chronically food-deficit. These countries' import requirements tend to be reasonably stable and predictable, since their demand tends to grow fairly steadily or their domestic production is not large enough to affect import needs very much. At the other extreme there are countries whose import requirements are small and confined to special needs. The quantities imported by these countries tend to be reasonably stable from one year to the next. In between these two extremes lie countries that meet a large proportion of their consumption needs from domestic harvests, but that rely on the world market to close the (often large) gap between production and
consumption. China is one of these countries. Obviously, their import needs can vary considerably from one year to the next depending on the varies of domestic grain production and marketing.

**Figure 4.5: Major World Importers of Wheat for Selected Countries (million tonnes).**

Sources: International Wheat Council and USDA.

There are three important features of the data in Figure 4.6 and Table 4.5. The first is the high degree of volatility in imports in many major markets. The former Soviet Union, whose imports went from 16 million tonnes to 28 million and then to 14 million in ten year from 1978 to 1988, is the most dramatic example. China was a small wheat importer in the 1960s and throughout most of the 1970s. During the 1980s and the early 1990s, China's wheat import fluctuated dramatically. For example, China’s imports almost double from the 1985 to the 1987. This fluctuation in China's wheat trade can be attributed to significant policy changes after 1978. One of the most interesting example is India, formerly a country with a serious grain deficit, where

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8 If we think about former USSR for longer time period from 1968 to 1984, its volatility of wheat import were even more fluctuated.
effective agricultural policies have ended this deficit and left the country with only a small, and in several recent years, a zero import requirement. The second important feature is that wheat import destinations have diversified as Central Planning Economies and Less Developed Countries have become more important (Carter, et al., 1989), the growing importance of a number of developing countries, particularly the regions with large populations and reasonable economic performance. Again, this reflects the underlying dynamics of consumption, since most of these countries have very limited domestic production capacity. For example, in Developing Asia, and North Africa and the Middle-East, the regions with rising incomes, reasonably prosperous and rapid economic development, the most of their wheat imports more than doubled over the last 30 years.

Table 4.5: World Wheat Imports by Regions for Selected Years (million tonnes).

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Developing Asia</td>
<td>7.7</td>
<td>11.1</td>
<td>9.4</td>
<td>15.2</td>
<td>9.1</td>
<td>11.6</td>
<td>13.4</td>
</tr>
<tr>
<td>North Africa and the Middle East</td>
<td>4.2</td>
<td>4.9</td>
<td>8.8</td>
<td>12.0</td>
<td>17.1</td>
<td>22.7</td>
<td>26.8</td>
</tr>
<tr>
<td>Latin America</td>
<td>2.4</td>
<td>-1.2</td>
<td>3.6</td>
<td>4.5</td>
<td>6.2</td>
<td>4.3</td>
<td>5.9</td>
</tr>
<tr>
<td>EC</td>
<td>4.8</td>
<td>4.0</td>
<td>4.4</td>
<td>4.5</td>
<td>4.5</td>
<td>3.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>0.6</td>
<td>1.1</td>
<td>1.8</td>
<td>2.1</td>
<td>3.9</td>
<td>5.4</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Sources: International Wheat Council and USDA.

The third interesting feature of the table concerns the EC and Japan. Japan's imports have been remarkably stable, reflecting stability in consumption and the absence of significant domestic production. This indicates that the switch in consumer diets towards bread has been completed. EC imports are declining, but do not fluctuate very much. The EC is a substantial net exporter, so
these imports can only be understood by recalling the important quality differences within the wheat market.\(^9\)

Figure 4.6 presents the data of major wheat exporters and Table 4.6 in Appendix presents data on world's total wheat export and market shares. Although there are some countries that export small amounts when their domestic harvest is very good, the world wheat market has been, and is likely to be, dominated by relatively few exporters—namely, the United States, the European Community, Argentina, Australia and Canada, who are only a few producers that produce directly and routinely for the export market.

**Figure 4.6: Major World Exporters of Wheat from 1960 to 1994 (Million tonnes).**

Sources: Based on data from the USDA, Foreign Agricultural Services and IWC, World Wheat Statistics.

\(^9\) EC production is overwhelmingly of soft wheat, and in many countries of the Community soft flours do not produce the kind of breads consumer prefer. Technical advances have allowed the extraction of gluten from soft wheat, gluten that can be added to a soft wheat flour and thereby produce a bread like one made from a hard flour. These advances have reduced, but not entirely eliminated, the need for imports of hard wheat from North America. Durum wheat is also imported into Italy for the production of pasta.
Obviously, the inherent variability in production means that export availability fluctuate from year to year. Even among these major producers it cannot always be asserted that export production is a viable, economically efficient industry. Hence the `vent for surplus’ is an important component of the world grain market (Carter, et.al., 1989).

The United States is not the world’s largest producer, nor has its production been growing impressively in the recent past. Yet the country is perhaps the most important producer and the largest exporter of wheat. Since the major wheat futures markets are in the US, and because of the link between prices in the US and those in the world market, any analyst of the grain markets needs to pay particular attention to developments in the US as well as other major grain exporters. The US share of wheat trade was over 40% in the early 1980s and had fallen to only 24% in 1986. The loss of market share was primarily to the EC, who is now one of the five major wheat exporters to have emerged in the last decades and whose net exports rose by one third, from 15 million tonnes in 1981 to 21 million in 1990. Recall that at one time UK and West Germany were Canada’s largest Markets. EC’s switch from being a large importer to being the third largest exporter is a major structural change (Carter et al).

Australia and Canada have been two of the five largest wheat exporters for years and both of them are very important exporters to China. In Australia and Canada, most of grain marketing is done by public bodies, the Australian Wheat Board (AWB) and the Canadian Wheat Broad (CWB). Although they do differ in important respects, as quasi-governmental institutions, they are able to conclude government to government sales, and to arrange official credit. In the last 30 years, Canada's market share in world wheat market ranges between 15 percent to 25 percent while Australia's ranges between 6 percent to 16 percent. In Figure 32.5, the two countries
exports are quite variable with different degrees but generally show upward trends from the middle 1960s the middle 1980s. Since 1987, Canada's volume of wheat export has increased with more fluctuations while Australia's volume of wheat export has declined steadily. It also seems that the market shares and the volumes of wheat export between Canada and Australia are negative related in most of time from 1960 to 1994. This probably because of, first, Canada's willingness to hold stocks (mainly on farms), provide assistance to farmers in low-price periods and have more stable demand pattern for high-quality wheat, second, Australia's exports are very sensitive to weather and wool prices as well as Australia has not held extensive stocks; nor has it heavily subsidized producers (Carter et al., 1989).

Another important wheat exporter is Argentina whose export has varied in last 35 years. Its lowest volume of export was 1.1 million tonnes in 1960 while its highest was 9.9 million tonnes in 1989. Since Argentina lacks storage facilities, with the result that it is under great pressure to export its crops as quickly as possible after harvest. It exports also depends on both production performance and policy changes. Even though Argentina has considerable potential to expand its wheat exports, it is unlikely that its relative importance as an exporter will change materially. It will continue to be a highly variable exporter that sells its entire crop regardless of price.
Chapter Five

Literature Review and Methods

Section 5.1: Literature Review.

For the traditional western economic theory, trade theory has been sophisticatedly developed since the time of Adam Smith (1773). To help reduce a complex problem to a more manageable form by isolating one sector of the economy or one (or several) commodity(ies) in the economy, Alfred Marshall (1890) developed the partial equilibrium model. This model is often applied to international trading of agricultural commodities.

Neoclassical trade theory, as it developed early in this century, holds that each trading region has an excess supply or excess demand function for any given commodity. Supply and demand functions for each region determine the excess functions in the world market. The world market clears at the world price. The absence of restrictions to trade allows the world price to determine quantities consumed and produced in each region. Neoclassical trade theory relies on the strong assumptions of perfect competition, product homogeneity, and the inviolate relationship between price and quantities supplied and demanded. The law of perfect competition assumes no exercise of power by trading regions in international markets. One price and homogeneous products mean that domestic production and imports are not distinguished in consumption. Products from all regions are considered perfect substitutes in consumption.

However, empirical models often imperfectly predict trade behavior. Recent extensions of trade theory have attempted to differentiate products and describe and predict behavior in imperfectly competitive markets. Actually, imperfectly competitive trade behavior is the other
major extension of neoclassical theory. State trading through national marketing boards and differentiated product sales through oligopolistic private firms have highlighted the importance of imperfect competition in theories of trade. Monopolistic and oligopolistic behavior between trading partners has been the theme in today's grain market. This is especially true in China's wheat import market.

It has been pointed out by many agricultural economists that agricultural economic research should be problem-oriented. Modeling and analysis of trade in Chinese grain commodities should be no exceptions (Xue Muqiao, 1980; Niu Ruofeng, 1982; Zhu Zhe, 1996). However, little theoretical work exists on international agricultural trade in the Chinese economy, especially in Chinese wheat imports. The studies that have been done on China's wheat import have been based on the conventional trade theories and their applications discussed above (Wong, 1985; World Bank, 1989a; World Bank, 1989b; Carter and Zhong, 1989; Surls, 1982; Lardy, 1983). These models of Chinese grain trade are unsatisfactory because the role of state plans is not incorporated into conventional models, and the dominance of prices in conventional models may not be appropriate in planned or mixed economies such as China's. Both the theoretical and empirical results for China are thus open to question.

In contrast to western trade theory, trade theory for planned economies is not well developed. In the case of China, Many analysts mentioned "Material Balance Principle" as a fundamental theory for a planned economy and grain trade (Ennew, 1989; Li, 1980, 1985; Chen, 1988; Lyons, 1987; Carter and Zhong, 1989). This theory assumes that trade requirements are the result of differences between expected targets and actual targets in national economic plans, not the result of the differences between market supply and demand. Market prices are therefore not
necessarily a key factor in trade decisions in this models. Minden (1985) pointed out that “China’s wheat import policy is an integral part of two policy systems: food policy, and foreign policy” (p103).

In modeling import demand for a centrally planned economy, Ennew (1989) points out that western trade theory and conventional demand models are inappropriate for the analysis of import demand in a centrally planned system because trade in a centrally planned economy is administratively planned rather than being a completely market-oriented activity. Some senior leaders and economists pointed out that socialist trade theory required that our foreign trade should be a planned trade and these plans should be worked out and controlled by central government. stressed that although we are carrying out a marketing reform in our economic system, this is not a capitalist reform but a socialist marketing reform. Therefore, our grain system, especially our grain foreign trade system must be planned and controlled by our central government. We should consider this seriously and take this as one of our national grain strategies (Chen, 1968, 1982; Mao, 1963; Deng, 1980).

Most of the previous studies on China’s grain economy all acknowledged that before 1978 the grain system in China’s economy was centrally planned and controlled by the Chinese central government (Wong, 1985; World Bank, 1989a; World Bank, 1989b; Carter and Zhong, 1989; Surls, 1982; Lardy, 191983). In contrast to the conventional trade theory, which is based on the free-market system, China’s grain system places the responsibility for grain trade, domestically and internationally, in the hands of a state monopoly. The trading activities of this monopoly are based on five-year or one-year plans. Therefore for modeling China’s grain trade, the problems must be
approached from the planner’s perspective with the emphasis on understanding the decision making process underlying China’s wheat imports.

On the other hand, China has reformed its grain system as well as its foreign trade system since 1978 and this has brought a lot of fundamental changes in China’s domestic grain marketing and foreign trade systems. These changes resulting from the structural reform need emphasis in following aspects such as the model designing, the function form of demand for grain import, the roles played by the international market prices and the Chinese government plan, and interactions of changes in government policies and international markets. Although several studies discussed the behavior of the Chinese government in international grain trade under its new grain system — “the mixed economy”, the unsolved problems are similar to those of the planned economy because the Chinese central government still has the power to manage its grain foreign trade with the plans and has the final authority over its wheat import with the plans made by state planning commission. Unfortunately, no theoretical model accurately represents the changing behavior of the government in the international grain markets. Past discussions of the changes in China have been discussed qualitatively but no theoretical model has been developed (Zhang Jiangou, 1994).

Section 5.2: Methodologies Applied in Previous Studies

In this section, we briefly introduce two methods for modeling grain import demand in a centrally planned economy such as China. The first method is called a "free marketing economic model" or the "conventional model". It is frequently used in free-market systems. This model heavily rests on a framework of decentralized decision making by private agent under competitive conditions. Government intervention enters this type of model only as an influence on the
conditions of supply and demand rather than as an alternative to the market mechanism (Ennew 1987, p110). The second method is called the "centrally planned economic model". This model is used for countries in which the national economy is controlled and planned by central government. The trading activities of a state monopoly are directly controlled by the government in the form of five-year or one-year plans. The economic systems in former USSR and the economic system in China before 1978 fit this description.

5.2.1: Conventional Methodology.

There are two approaches under the conventional methodology: the direct approach and the indirect approach.1 The direct approach requires that imports be estimated directly as a function of a range of conventional explanatory variables including grain outputs, prices in world markets, domestic population growth, and other determinants. Surls (1984) suggested several possible explanatory variables that affect China's grain trade levels. These variables include the urban grain demand and supply balance, world grain market prices, the balance-of-payments situation, trade policy, and economic priorities. Surls attempted to use an econometric model to verify the determinants of China's grain. Most of the studies this nature have used a linear, single equation demand system in which the main orientation of the independent variables was economic rather than political. As a conventional modeling methodology, this approach is subject to the criticism that it fails to recognize explicitly the role of the planning process in determining import requirements in China's grain system. This approach is also inappropriate for a planned economy

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1 Actually, there is no one in previous studies categorized the approaches in modeling China's grain import as "direct" or "indirect". For convenience, I summarized from papers I read and categorized them into these two approaches.
system because it does not distinguish the characteristics of a centrally planned system from a free-
market system.

Wong (1985) attempted a more systematic appraisal by the application of regression analysis to capture some systematic elements embodied in China's wheat import program in order to develop greater insights into the basic policy rationale and motivations. One of the main themes of Wong's research was the assertion that China's wheat import decisions are significantly affected by market forces such as world prices. His wheat import demand model was composed of economic rather than political variables. He used a conventional model and specified wheat imports in quantity as a function of the unit price of imported wheat, the quantity of exported rice, domestic output of grain and wheat, and population growth. He also tried formulations expressed in the current year and with a one year lag. The most critical omission in this model is government policy effects on import demand, the central government control and the influence of other possible systematic determinants that would affect domestic wheat import demand. Consequently, most of the estimated coefficients were not statistically significantly different from zero, and the goodness of fit conditions of the models were extremely poor (Wong, pp 130-131).

The indirect method of modeling import demand entails constructing a grain balance sheet and estimating grain imports as the difference between domestic production and consumption. This approach is based on the assumption that any shortfall between estimated production and consumption is automatically made-up by imports. A typical example is from Carter and Zhong (1988). Others can be found from the World Bank (1985a, b), Noh (1983), Jian Li (1990), T. Wiens (1980), J. L. Buck and V. Smil (1978,1980 and 1981), Wang Hong-Gang (1985) and The FAO (1971, 1977 and 1982).
A World Bank (1985a, b) publication, <<Long-Term Development Issues and Options for China>> used a material-balance table to simulate the trade behavior of the Chinese government. In this publication, foreign trade in particular sectors is adjusted in each period to fill the gap between domestic demand and supply. Other research by Carter and Zhong (1988), used the same idea to form a balance sheet to predict China's grain trade trends. Carter and Zhong used grain balance sheet to estimate China's grain imports. The grain balance sheet for China was formulated as:

\[ \text{Grain deficit} = \text{Grain output} - \text{Grain consumption} - \text{Seed} - \text{Other utilization} - \text{Stock} \]

The authors assumed that "under current policy, the deficit in grain supply is likely to be solved with imports rather than through restrictions on consumption as long as the deficit is not too large." (p110) The authors also believed that since China's grain trade continues to be used as a buffer against domestic shortages and surpluses, growth and instability in domestic output are automatically reflected in its foreign trade.

However, this approach is rather inflexible because it implies that any shortfall between anticipated production and target consumption is automatically made up by imports. Carter and Zhong admitted that 1) these grain balance sheets do not explain the components of China's grain import such as wheat; 2) the reasons of the fluctuations in China's wheat import with any economic variables such as the prices in world grain market. The data used for the sectoral analysis in the Carter and Zhong study was all published by the Chinese Statistical Authority (the SSB) and has been questioned by many researchers. Although this approach acknowledged that the grain system in China's centrally planned grain economy is different from that of the western
countries, it is still not appropriate for studying China’s wheat imports. Carter and Zhong also pointed out that the methods of using balance sheets do provide a useful method of estimating grain usage and consumption. The material balance method does not take account of the systematic changes in China’s grain economy after 1978 when China started to carry out its Economic Reforms. Finally, the method does not consider the effect of prices on import demand.

5.2.2: Materials Balance Theory and Planning Trade Methodology

Most models built for China’s wheat imports in previous studies are established on a framework of the western trade theory and are based on an assumption of decentralized decision making by private agents under competitive conditions. In contrast, China’s grain system in both the previous planned economy and in the current mixed economy places the responsibility for wheat imports in the hands of a state planned monopoly. The trading activities of this planned monopoly are directly controlled by the government in the form of one-, five- and ten-year plans. In contrast to conventional perceptions, China’s wheat imports are accepted as a means of obtaining those commodities required to meet the grain planned balances in local and central governments rather than to react to “current” market demand.

The questions that need to be addressed in building such model are: what were the motivations of the Chinese government to increase wheat imports after 1978 given its “grain self-sufficiency policy”? What is the mechanism by which China’s authorities decide how much to import? and what are the major causes for fluctuations in China’s wheat imports.

In China the central planning basis of resource allocation is the Materials Balance Principle — primarily an accounting device — used to ensure consistency between the output (supply) of
commodities and their various uses (demand). An imbalance between the output (production) and input (consumption) sides of the materials balance will result in failure to achieve stated goals in the government plan. To correct such imbalances requires changes in either output (production) or input (consumption). Before 1978, the state rationing of grain for human consumption and the planned supply for industrial and other uses prominently dominated the whole grain system. The Chinese government usually controlled grain consumption in urban areas by issuing grain coupons to each person classified as an urban resident. Since the later 1970s, the Chinese government has put more attention on the grain output side and been trying every effort to meet requirement from input (demand) for grain. The grain plan used before 1978 can be described as a supply-oriented grain trade plan while the grain plan used after 1978 can be described as a demand-oriented grain trade plan.

Like many centrally planned economy, such as the former USSR, the Materials Balances Principle in China is used at both the provincial level and the central government level. It is through the use of the “National Economic Materials Balances Table” that import requirements can be determined by planners in the provincial governments and then finally in the central government. All of these calculations on differences between input (demand) and output (supply) are the responsibility of the SPC (the State Planning Commission) at both the provincial and central levels and are made in consultation with the Ministry of Foreign Trade and Economic Cooperation, the Ministry of Internal Trade, The Bureau of Grain Reserve, and the relevant Ministries and provinces. The Central Planning Commission has more decision-making power on grain trade, especially on wheat imports, than other ministries and any province. The MOFERT and its foreign trade corporations, such as COFCO, play a single-desk-buying or single-desk-
selling role in international grain market while the Ministry of Internal Trade and the Bureau of Grain Reserve play a dominant role in the domestic grain market.

Zhu Ze (1996) pointed out that China's grain distribution and marketing system was established on planned economic theory which was created by Marxists and then developed by former USSR socialists. Although China has been reforming its grain system since the late 1970s and making it more market oriented, the central plan and control systems are still necessary for China's grain system, especially for grain trade. China's planning grain trade system has been successful in the past and it will play a key role in China's future grain international trade.

The study of Chinese grain imports is complicated in that import behavior is subject not only to various demand and supply-side pressures, but also to policy decisions in an economy which is evolving from central planning to more reliance on market mechanisms. On the other hand, the growing importance of China's grain imports program and uncertainty about wheat import have promoted a number of competing arguments to explain wheat import behavior. Chief among these have been the consideration of price arbitrage, involving the sale of expensive rice and the purchase of less expensive wheat, the increase in incomes and the associated pressure for a better diet, the shortage of domestic grain production, the availability of foreign exchange, and policy changes and/or difficulties concerning grain procurement and distribution.

In contrast to the above idea, a World Bank (1985b) publication, Long-Term Development Issues and Options for China used a Material Balance Table with the conventional trade theory to simulate the trade behavior of the Chinese government. In this study foreign trade in Chinese grain sector is adjusted in each period to fill the gap between domestic demand and supply. Other
studies made by Noh (1983), Carter and Zhong (1989), and Carter et al (1989), used the same idea to in their modeling of Chinese grain imports.

In contrast to the conventional model, the centrally planned model is established on planned economic theory. In a centrally planned economy, the basis of resource allocation is built on the material balance principle, primarily an accounting device, used to ensure consistency between the output of commodities and their various uses. According to planned economic theory, an imbalance between production and consumption will result in failure to achieve stated goals. Correcting such imbalances requires changes in either production or usage. Ennew (1987) derived a model from the material balance principle to explain the former Soviet Union's grain imports from the early 1970s to the late 1980s. Ennew called this model a "trade planning model." This model proposes that grain production targets are most appropriately viewed as statements of domestic grain requirements, rather than anticipated grain production.

Ennew (1987) built a model based on materials balance theory. In this "planning trade" model (Ennew, 1987; p111), planners can identify the expected difference ($ED$) between demand and supply of grain by taking the difference between the likely level of production ($QE$) and the planned targets ($QT$). That is:

$$ ED = QE - QT $$

If $ED$ is negative, it indicates the level of imports which are likely to be required to ensure a material balance. However, variability in yields implies that the actual difference ($AD$), the difference between actual production ($QA$) and target production ($QT$), will differ from its expected level. This difference is the unexpected difference ($UD$). Thus,
\[ ED_t = QE_t - QT_t \]

\[ UD_t = AD_t - ED_t = QA_t - QT_t - ED_t = QA_t - QE_t \]

After considering the conventional variables that relevant for the former Soviet Union to play its role in the international grain market, final model’s functional form of import demand was expressed as:

\[ I_t = f ( ED_t, UD_t, WPD_t ) \]

Where:

\[ I_t = \text{net grain imports at time} \ t. \]

\[ WPD_t = \text{the hard currency/world price at time} \ t. \]

This model is useful because it emphasizes the role of planning in determining grain imports. It also combines some important factual determinants from both the “conventional model” and the “planned model”. This makes the model quite flexible because it implies that any shortfall between anticipated grain production and expected and unexpected differences is not automatically made up simply by imports; conventional variables such as price must be considered in the decision making process. “This model also permits forecasting ability to predict the future import demand” (Ennew, 1987; p145).

5.2.3: Other Methodologies Used in Modeling China’s Grain Sector.

Generally speaking, there are three approaches are available for the research of China’s grain economy and development: there are: mathematical programming, simulation and
econometric methods. Each technique has its own characteristics, and the choice depends on the objectives of the research, the nature of the system being analyzed and the data available. The history of the application of formal, quantitative, economic analysis to Chinese agriculture is very short and the literature containing models of Chinese grain economy by Chinese economists has only really developed since 1978. Apart from the disruption to research during the Great Cultural Revolution and the isolation of Chinese economists, a substantial impediment to useful quantitative research has been the lack of a comprehensive, agreed, solid theory of producer and consumer behavior under the Chinese centrally planned economic system. The models which have been built were mainly used for output projection and the selection of farming structure. Typical examples among them are the multi-objective mathematical programming model of grain sector (Chen et al. 1983), the large scale linear programming model of grain and cash crops for the year 2000 (Grain and Cash Crops Development Research Group, CAAS, 1985) and the model of input-output analysis of Chinese agricultural sector of 1982 (Chen et al, 1985). These studies and the analysis all represent the application of Western analytical techniques to Chinese circumstances. The challenge is to discover which of these techniques may be usefully applied to a very different market system from that for which they were designed.

In this thesis, an econometric method has been chosen for our study, mainly because of its positive nature, the availability of time-series data and its suitability for assessing the impact of changes in policy on grain trade. The purpose of methodology applied in this thesis is to develop one model of Chinese wheat imports that incorporates aspects of both the material balance model (the planned model) and the western model (the conventional model). This “mixed” model would

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allow grain imports to depend on aspects of each model and we could then test which variables are
important determinants of wheat imports into China. Instead of assuming one model or the other,
this mixed model would allow us to test the hypothesis that the regime shifted from a pure
materials balance to a more western style model where grain imports depend on prices and other
variables. For this purpose, we can test our hypothesis with different means such as time-varying
coefficients, interactive terms between some of the variables and time, or with a switching model.

Section 5.3: Consideration of Time Period Division

One of the major issues in this study is that what the criteria we should use to have in
determining the systematic consistency in trade polices and practices of China's wheat import and
how to divide the whole period of China's wheat import from 1960 to 1994 into different divisions
for modeling. Previous studies on China's grain production, consumption and wheat import reveal
that although the agricultural planning and management system changed from time to time after
the land reform in 1952, there are basically five or six periods which cover the major patterns of
the Chinese government grain policies (Wong, 1985, World Bank, 1985a, 1985b; Lardy, 1982;
their book, China's Grain Production and Trade, They wrote:

“Our division of the 35 years [between 1949-1989] is quite similar to that made by leading
Chinese economists ...., and a research paper by the Commercial Economics Research Institute of
the Ministry of Commerce. They divided the evolution of the Chinese Economy into six periods:

1953-1957: The First Five-Year Plan period.
Indeed, the division of Carter and Zhong is not only consistent with Chinese economists but also consistent with the Chinese government. At the same time, most economists in the western countries are in agreement on this division (China State Statistics Bureau, 1985-1990; Niu Roufeng, 1989). Since this study focuses on the period from 1960 to 1994 in which China started in 1960 to import wheat on a significant large scale and started in 1978 to carry out the economic reform, we shall therefore limit and emphasize our study within this period. The period before the economic reform is virtually a period in which the centrally planned system was prevailing. For this reason, we only divide the years whole period from 1960 to 1994 into two subdivision. The first period is from 1960 to 1977 and the second period is from 1978 to 1994.

Another issue is why Carter and Zhong indicated the reason why they chose 1977 as the startpoint of the Economic Reform period. The Cultural Revolution was officially ended in 1976, However, The dividing line drawn in 1976 may be correct for a political analysis, but, for an economic analysis, it may be appropriate to draw a dividing line at the end of 1977 because in 1977, there were some major agricultural provinces started to reform their production systems. Based on the policy review, Kraus (1982) indicated that although the administrative planning system was set up in the early 1950s, for several reasons, direct control of grain economy by the central government was not carried out until 1956. Fan (1990) stated that “the obvious step at this point is to divide the whole period into two periods, one part to comprise 1961 to 1977, the other, 1978 to 1990” (Fan, 1992; p227). When Fan divided the whole period into two segments, he focused his study on China’s land productivity and labour productivity after the Great-Leap-
Forward Period. However, his division of the whole period is based on view of government policy consistency. Chen (1991) stressed that "... Although the manifestations of these reforms may vary from time to time and from area to area, the basic measures of these economic reforms include decentralizing management, reducing control of ownership, initiating price reform, opening free markets, encouraging individual initiative, and showing more concern for consumer welfare. From a perspective of operational mechanisms in the economy, the transition from a traditional planned economy to a mixed economy that combines the dual features of planned and market economies is the most meaningful and interesting structural change in the socialist economies" (Chen, 1991; p137).

Since our study focuses on China's wheat import, which mainly started in the early 1960s, the policy consistency of the Chinese government grain system, which had a fundamental change in 1978 and grain policy impact on wheat import, the relevant division of time periods should be within the 35 years from 1960 to 1994. Under this consideration, we divide the 35 years into two periods, one is from 1960 to 1977 and another one is from 1978 to 1994. We called Chinese wheat import systems a "direct control system" in the first period and an "indirect control system" in the second period. As our basic patterns of the division. As there have been no dramatic shocks in inputs use or technological change, the shifts in government policies are suspected as a principal factor explaining the observed development pattern. The major reasons of this division are: 1) it was in 1960 that China started to import a large amounts of wheat due to a period of a large scale disaster caused by policy failure. 2) it was in 1977 that the key policy started to make changes, and reforms were initiated which brought more increases in grain production and a larger scale of fluctuations in wheat import. 3) As a centrally controlled grain import system, any changes from
the central level must bring out a fundamental transition in its system therefore an impact on China's wheat import must be examined under this consideration. We need to point out that since previous studies have widely covered China's grain economy and grain trade, we will focus our study on China's wheat import. Therefore, the 35 years period is not to isolate China's wheat import system from the whole grain economy and the two-period division serves as a link between past inertial effects and future changes.

Section 5.4: Data and its Sources

Research on Chinese grain economy has always been hampered by data problems. One of the most important and widely recognized limitation of analyzing Chinese grain trade behavior is the poor quality of the data being analyzed. This is particularly so for research conducted outside of China. Stone (1982) indicates:

The quality of Chinese statistical series has varied widely through time for historical reasons. Unlike many developing countries where statistical collection has made steady, if slow, progress, Chinese statistical collection has both advanced and regressed. The rudiments of a national system were established in 1952 with the formation of the State Statistical Bureau (SSB), and subsequently destroyed during the Great Leap Forward (1958-1960), when statistics were declared "a weapon of class struggle." Although the Chinese statistical system recovered to a certain extent during the early 1960s, it was dealt a staggering blow during the Cultural Revolution, especially the first stage (1966-1969), when responsibility for record keeping was withdrawn from professionals and charged to cadres, whose promotions depended on the records in their own ledgers (Stone, 1982, pp205-206).

Consequently, the quality of Chinese statistical data produced from 1958 to 1977 should be recognized as one limitation to any analysis of Chinese activities. However, the quality of Chinese statistical data have improved since the late 1970s because the Chinese government decided to "seek truth from the facts" in national economic activities, especially in statistics.
collection procedure. Since the late 1970s, the statistics collection system was rebuilt from the central bureau State Statistics Bureau (SSB) to provincial and local offices Provincial Statistics Bureau (PSB). The statistical staff have been trained in data collection and reporting. The governments in central and provincial levels have been practical and realistically in their data collection, submission and reporting. This has been particularly true in the grain sector because the more output one reported, the more the government would procure. Local governments started to be conservative in their data submission and reporting (Wang, 1994).  

Another data problem is that for several variables considered important in this import analysis, a complete time series of data is not available. Many of these data have only been released by the Chinese government since about 1977. But, as also observed by Stone (1980, p206), “in spite of these problems Chinese statistical data are still very useful and are undoubtedly superior to those of the majority of developing countries.”

The data used for this thesis are from different sources and are publicly published by internationally recognized organizations such as Food Agricultural Organization (FAO), International Wheat Council (IWC), the United States Department of Agriculture (USDA), World Bank, the Australian Wheat Board (AWB) and the Canadian Wheat Board (CWB). Some data is published by the Chinese Statistical Authority and is contained in the Chinese Statistical Yearbook (TJNJ) from 1980 to 1995 editions. Another major data source is contained in the

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3 Interview with Xiaohong Wang, Director of Agricultural Statistics Department, SSB. 1994.
4 The Chinese Statistical Authority is the State Statistics Bureau, SSB. SSB publishes its yearbook called the Chinese Statistical Yearbook. In Chinese it is called Tong Ji Nian Jie (YJNJ).

Data of Chinese grain trade (including quantities and prices of grain imports and exports) were supplied by individuals working in the Department of Planning and Statistics, the Ministry of Foreign Trade and Economic Relations, and individuals working in the Department of Grain Trade, COFCO. Data of national grain production, consumption and trade are provided by individuals working in respective bureaus of State Planning Commission (SPC). These include the data: 1) state planned grain target (QT), 2) the level of grain production estimated by the SPC for each year (QE) and 3) the actual grain output (QA). Some of the time-series data used in modeling are presented at the end of this thesis as Appendix.

<sup>5</sup> The Chinese Statistics of Agricultural Economy, Nong Yie Jin Ji Zi Liao (NYJJZL), changed it name in 1988, to Statistics Yearbook of Agricultural Economy, Nong Yie Tong Ji Nian Jie (NYTJNJ),
Chapter Six:

Theoretical Consideration and Model Specifications

Section 6.1: Major Variables from The Materials Balance Principle (Planning Theory)

According to the Materials Balance Principle and the government grain plans, the required grain input (demand), i.e. stated grain targets ($QT$) and the expected grain output (supply), i.e. the stated level of grain production ($QE$) should be equal to each other. Planners can identify the expected difference ($ED$) between grain input (demand) and grain output (supply) if there are differences between $QT$ and $QE$. Each year, before harvest, the State Planning Commission determines the national expected level of difference between expected output and target requirement, based on data collected by the State Statistics Bureau, the Ministry of Agriculture and provinces. It then calculates ($ED$), as

$$ ED = QE - QT $$

If $QE < QT$, then $ED$ is negative. This indicates that grain supply is possibly less than grain demand. Grain imports are the likely to be required to ensure a materials balance. If $QE > QT$, then $ED$ is positive. This indicates that grain supply is possibly more than grain demand. Grain imports are not likely to be required in this case.

Figure 6.1 shows the relationship between China’s wheat import quantities and the government expected differences for every year from 1960 to 1994. Figure 6.1 reveals some
points to us. First, Chinese government has imported more wheat than its expected differences since 1960 and this situation has been becoming more obvious since 1978. Second, the fluctuations in wheat imports have been much more dramatic, especially since 1978, than they are in the expected differences \((ED)\). This can be viewed as wheat imports are not only related to the planners' expected differences but also related to other factors such as \(QA\), the actual grain output, and \(QT\), actual grain demand, probably, prices of wheat in the international wheat market are one of the factors affecting China's wheat imports.

**Figure 6.1: Wheat Import Quantity and The Government Expected Difference (1,000 tonnes).**

However, year to year variability in yields implies that the actual difference \((AD)\) — the difference between actual production \((QA)\) and target production \((QT)\) — will differ from its expected level \((QE)\). On the other hand, the difference between \(AD\) and \(ED\) can be implicitly related to grain policies of the governments at different levels. The difference between \(AD\) and \(ED\) can thus be considered to be the unexpected difference \((UD)\). Thus, after harvest, planners in local governments and the central government can adjust their current year's grain plans and figure out actual differences between grain demand and supply:

\[
AD = QA - QT
\]

The unexpected difference:

\[
UD = AD - ED
\]

Since

\[
ED = QE - QT
\]

\[
AD = QA - QT
\]

As \(UD\) is the difference between the actual difference and expected difference, finally the State Planning Commission can calculate

\[
UD = AD - ED
\]

or

\[
UD = (QA - QT) - (QE - QT)
\]

\[
UD = QA - QE
\]
The unexpected difference \((UD)\) can only be identified post-harvest and depends upon the extent to which actual production differs from expected production. If actual production is above expected production, such that:

\[ QA > QE \]

then the unexpected difference \((UD)\) is positive; grain supplies will be above their expected levels. Conversely, if actual production is less than expected production, such that:

\[ QA < QE \]

then the unexpected difference \((UD)\) is negative which means grain supplies will be not able to meet expected level. Therefore more wheat imports are possibly required.

The expected deficit \((ED)\) is known pre-harvest and can be incorporated into trade plans, whereas the unexpected deficits \((AD)\) and then \((UD)\) are not known until the end of the harvest period and can not be included directly into the grain plans. Consequently, planners in the central government might be expected to treat these two variables differently, in which case \(ED, AD\) and \(UD\) should be regarded as separate explanatory variables in the model.
Data for $QA$ is actual annual grain output which can be found in the China Statistics Yearbook, FAO Production Yearbook, and the USDA Statistics on grain output for each country. $QT$ is called "target output" in the materials balance table but it actually presents grain or wheat demand (target for demand), which is generated by the Chinese State Planning Commission based on previous demand data and information supplied by local governments, the Ministry of Agriculture, The Ministry of Internal Trade, and the State Bureau of Grain Reserve. $QE$ is estimated by combining the data collected by State Statistics Bureau, the Ministry of Agriculture, and local governments. $QE$ is adjusted during the year before the harvest but the change is not significant.

To identify the expected and unexpected differences between target production and actual production requires information regarding the targeted grain consumption levels used in deriving materials balance and the expected level of production as perceived and estimated by policy makers. Following the suggestion of the previous sections, the output target of grain will be taken as domestic grain requirements rather than expected grain production. Ennew (1987) stated that "there is no direct information concerning expected production levels; a suitable approach is to employ a trend model to describe the development of output over time. On the grounds of simplicity, it was assumed that policy makers would envisage yields and therefore production to be trending upwards over the period as a simple linear function of time" (p 115). Then Ennew applied a trend model to describe the development of expected output over time.

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1 According to Ms. Liu Hong, a deputy director of Grain and Food Bureau, the Chinese State Planning Commission. Data for estimating $QE$ is collected every year from more than 4500 stations in different areas by State Statistics Bureau and the Ministry of Agriculture.
\[ QE = f(T) \]

However, the data for expected level of grain output \((QE)\) in China is estimated with different method. Hong Liu (1994)\(^2\) explained how the Chinese planners to gain the data of \(QE\):

we have to make certain estimation on our grain output every year before our annual planning conference for our grain plans including our grain trade plan. The estimations of expected grain output are based mainly on the data from local data collecting stations. With our experience from previous years, we can estimate our expected grain output for current year. This is one of the key procedures in our state planning commission. At the national annual planning conference, there are sometimes quarrels and debates, as many local governments (i.e. provincial governments) want more for themselves. Without our expected grain output every year, we can not appropriately make our grain plans, especially our grain trade plan.

Apparently, the data collected every year by State Statistics Bureau and the Ministry of Agriculture from more than 4000 stations cross China is the basic information for the planners to estimated expected grain output. Therefore China’s expected grain output \((QE)\) is not estimated by a regression on a linear function form. Having obtained the data for \(QA, QE\) and \(QT\), the calculations of expected difference \((ED)\) and unexpected difference \((UD)\) can be made using the definitions above.

\(^2\) Interview with Ms. Hong Liu, Deputy Director of Grain Bureau, State Planning Commission, Beijing.
Section 6.2: Major Variables from the Conventional Marketing Theory.

For any marketing-oriented foreign trade, imports demand equations must be identified by several independent variables as important factors for that marketing-oriented system such as product's own price, income and population. In the Chinese government's grain plan, variables such as income and population have been considered in its required grain input (demand) plan, i.e. grain target ($QT$). They are quite straightforward and need no further explanation. However, there are other variables that might affect China's wheat import demand. Wilczinski (1969) emphasized that it would be unwise to assume that foreign trade of grain in a planned system for any commodity is simply an accounting residual. Although, in view of the conventional marketing theory, China's wheat imports have been separated from its domestic grain market (Ze Zhu, 1996), the extent to which a demand-supply imbalance can be met by imports will still depend on other variables such as prices on the international wheat market, foreign currency availability, and the hard currency required by other importing sectors.

There have been attempts to test empirically the validity of various explanations of China's grain import. Surls (1978) estimated the demand for net wheat and coarse grain imports from 1961 to 1975 as functions of lagged domestic grain production, the hard currency balance of trade surplus in the preceding year, and world market prices. Surls's study showed no significant correlation between wheat imports and either production or prices for the period studied. Wong (1988) regressed China's wheat imports against such variables as unit prices of imported wheat, per capita grain output, population, and domestic wheat output. No significant statistical
relationship was found. This led to Wong’s rejection of the production shortage explanation in favour of the distribution argument.

In a model of what policy for China featuring production, consumption and wheat import, Halbrend, et al (1990) estimated China’s wheat import demand from 1960 to 1987 as a function of wheat production, the rice/wheat price ratio, and foreign exchange earnings. It was concluded that these variables exert significant impact on China’s wheat import demand. However, as in most other previous empirical studies, certain explanatory variables of China’s wheat import demand were omitted such as the government planning in grain system and the policies in the economic reform. Also it is still not clear in Halbrend’s study that wheat imports in China are mainly consumed by people in cities and towns.

Before 1978, the Chinese government argued that China’s involvement in world grain trade was purely for the regulation of grain varieties, or at least, an issue of food safety for political stability (Liu Hong, 1994). The prices of wheat imports were not of concern when deciding to purchase from the international wheat market. However, after 1978, the officials in the central government publicly admitted that China’s wheat import volume was decided by not only domestic output but also by wheat prices in international markets. Chinese Vice Premier Jiyun Tian (1982) noted that there are also restraining factors on grain imports, such as limited supplies of grain surplus and rather high prices. During the early 1990s, Vice Premier Rongji Zhu indicated to officials in the State Planning Commission and the Ministry of Foreign Economic Relations and Trade that China should import wheat when the prices in international market were reasonable even if China had reached its grain output targets. This reveals that prices started to be one of key
factors affecting China's wheat imports after 1978. However, Mr. Yiawei Lin pointed out that price elasticity responses of China's wheat imports have been low since 1960s, perhaps less than 0.8, because the decisions of China's wheat imports in the past were heavily influenced by political considerations rather than prices. Since 1978 our grain system has been reformed but political considerations as the first priority in our grain foreign trade have maintained and will continue to be in the future. Therefore price will not have the first decisive effect on wheat imports. It is obvious in reality that the Chinese government takes political and social stability as its first priority in its grain foreign trade.

According to the conventional trade theory, prices in the world wheat market should be used as the major factor of economic inducements to trade. Changes in prices are expected to have a direct impact on the quantity traded of corresponding products, either imported or exported. Thus, any increases in world wheat prices would have negative effects on the amount of imported wheat. Figure 6.2 shows the relationship between Chinese wheat import quantities and average prices.

The price was converted to a real term by an index of wheat export price published by the United Nations. Ideally speaking, an price index of China's total agricultural imports should be much better than any index of annual values of China's total imports. The index we used in this research may give a reasonable measure of year-to-year changes in China's total import. From the planners' point of view, this index may also give a measure of how much important of wheat price

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3 Mr. Yiawei Lin was Vice Minister of the Ministry of Foreign Economic Relations and Trade. I interviewed him in 1993 in Beijing, China.
in the international grain market and let the Chinese government know the relative availability of hard currency. However this index is not available

**Figure 6.2: The quantity of Chinese wheat imports and the deflated wheat import prices.**

Sources: *UN International Trade Statistics Yearbook and Foreign Trade Bureau, State Planning Commission, China.*

One of the argument about China’s grain importation was first proposed by the Chinese central government. It was claimed that China’s grain import programme was operated to take advantage of “food arbitrage” based on the wheat imports and rice exports because exporting prices for rice were higher than importing prices for wheat in the international market (Wilson, 1964, Wong 1985). These price differences are appreciable. During the period of 1960-1990, the
international rice price was, on average, more than two times China's wheat import price\textsuperscript{4}. This structure of prices implies that, on average, China's export earnings on rice covered 32.7 percent of its wheat import bill, although the quantity of rice exports was only 14.5 percent that of wheat import. However, the price-related argument does not furnish a complete explanation of China's wheat imports, even in earlier years, because the earnings from rice exports had been far from sufficient to pay for wheat imports (Mah, 1971). Furthermore, most of China's rice exports during the 1960s and 1970s were politically-oriented export. Besides rice exports have decreased since the early 1980s, in 1990, the Chinese government announced that it would ban exports of rice.) It seems that relative grain prices may have influenced China's wheat import decisions, but the "food-arbitrage" motive does not appear to have played a major role in China's wheat imports, at least not in past 20 years.

Foreign exchange availability is considered as one of the factors that may affect China's grain imports (Surls, 1978; 1984). In his paper, "the international Impact on Chinese Central Planning", Perkins (1967) pointed out the basic strategy of international trade for China's planners. He mentioned the trade limitations due to the "grain self-sufficiency" policy of the Chinese economy and the limited availability of foreign currency to the Chinese government. As in any developing country, scarce foreign currency must be used to pay for foreign capital goods and new technologies as well as for foodstuffs. The availability of foreign exchange, then, is a possible constraining influence on Chinese wheat imports. The exchange rate between the Chinese Yuan and the US Dollar, and Chinese foreign trade balance are potentially influences the level of wheat

\textsuperscript{4} Calculation is made by the Foreign Trade Research Institute of MOFERT. The data was based on the price data of MOFERT and Statistics of China Custom.
imports into China for the last 35 years. However, the effects are different during the periods of 1960-1977 and 1978-1994.

During the period of 1960-1977, the exchange rate between the two currencies was fixed by the Chinese government. The foreign trade balance during the first period was one of the key factors in the industrialization plan of the Chinese government. It is generally accepted that in the first period, from 1960 to 1977, since the centrally planned and controlled policy dominated not only whole nation’s economy but also China’s grain trade, the Chinese government could easily integrate all factors including foreign trade balance and foreign currency exchange rate in its grain trade plans, especially its wheat import plans.

However, in the period of 1978-1994, the exchange rate between the Chinese yuan and the US dollar was no longer fixed by the Chinese government. The rate varied dramatically from about 1.4:1 in 1978 to about 8.7:1 in 1994. This variation was mainly the result of the economic reforms and system transition. Furthermore, because of the “open door policy” and foreign trade decentralization starting in the late 1970s, the controlling power of the central government over foreign trade balances in local governments was reduced. Although for the past 18 years the central government has pursued a decentralized foreign trade system, grain trade, especially wheat imports, has continued to be firmly controlled by the Chinese central government. Rongji Zhu (1994) pointed out that considering our political and social stability, China’s grain imports must rest on two major policies: grain self-sufficiency policy and centrally planned trade policy. It is impossible for the central government to loose its control over grain trade.
In China, grain distribution is dominantly controlled by the government compulsory delivery system and this system has been instituted by the Chinese central government since the mid 1950s, therefore another possible explanation about China's wheat imports that has often been proposed is based on the problems of internal grain procurement, distribution and transportation systems. The procurement, distribution and transportation arguments have been echoed by Perkins (1975), Timmer (1976, p66), Walker (1977), Wong (1980) and Kueh (1984). It has been indicated by many researchers that China's grain procurement and transportation systems lie at the heart of the problem of grain distribution. One of the arguments is that annual wheat imports are equivalent to only a small proportion of domestic grain production, but are a significant percentage of the quantities procured by the state. With the importation of wheat, the central government is able to reduce its requirements for grain delivery and thus ease the tension between grain surplus and deficit regions.

Although transportation is indeed an important factor influencing the nation's overall supply/demand balance, in reality, China's transportation system has improved since the second period. The Chinese grain distribution system has not been capable of effectively responding to changes in demand, and the Chinese government has frequently had to rely on foreign trade to deal with imbalances in domestic grain distribution (Sicular, 1985), but Donnithorne (1970) argued that the purpose of China's wheat imports is to supply urban consumers who are heavily concentrated on the eastern coastal area of three metropolitan cities in which transportation system has been modernized and is much more effective than in other areas in China. Therefore, this factor should not be separately considered in modeling wheat import demand in China.
Section 6.3: "Mixed" Economic System, Dummy Variables and the Interactive Terms

One of the major objectives of this thesis is to reveal the effect of the changes of government policy on Chinese grain trade, especially wheat import, during the different periods. During the period from 1960 to 1977, wheat imports into China were comparatively stable. However, during the period from 1978 to 1994, China's wheat imports followed an extremely erratic course. Therefore, shifts in government policies are suspected to be the main factors explaining these patterns. Based on the policy review described in previous chapters, the principal hypothesis of this thesis is that the development of China's wheat imports were significantly influenced by government's decentralization policy, i.e. the impacts from the economic reform during the second period on the government trade plans have significant effects on Chinese wheat imports. Therefore, a dummy variable for the policy change and system transition is introduced in our model. The dummy variable will be entered into the regression as an intercept dummy ($DUM$) coding with a value of zero before 1977 and earlier, and coding with a value of one thereafter. The assumption behind this dummy variable is that due to the policy changes, Chinese wheat imports have been significantly influenced by the impact of the economic reform not only on planning variables such as expected difference ($ED$) and unexpected difference ($UD$) but also on marketing variables such as prices of wheat imports ($WIP$) and foreign exchange rates between Chinese Yuan and US Dollar ($FOREX$).

Slope dummy variables are created with the wheat import prices, the expected difference, the unexpected difference and the foreign exchange rates for interactive terms ($DWIP$), ($DED$), ($DUD$) and ($DFOREX$) respectively. The purpose of entering these slope dummy variables into the regressions is to determine if the policy of the economic reform started in 1978 created any
structural differences with respect to the wheat imports. The expected difference (ED) and the unexpected difference (UD) are chosen for the slope dummies because we try to testify that China’s wheat imports are interactively dominated by the impacts from the economic reform and the central plans during the second period. We expected to see some impacts of the economic reform on the expected difference (ED) and the unexpected differences (UD) and further on the changes of QE, QA and QT. The import price variable is chosen for the slope dummy because we need to see if the price factor has had more influential effects on China’s wheat imports since China started to reform its economic system than it did before. The foreign exchange rate between Chinese Yuan and US dollar is chosen for another slope dummy in order to determine if the policy changes in 1978 have made the government more sensitive to the foreign exchange rates experienced rising trend.

Section 6.4: Model for the "Mixed" Wheat Import System.

Given the Chinese government’s stated policy of grain self-sufficiency and China’s status as “an enigma in the world grain trade” (Timmer and Jones, 1986; p25), establishing a suitable model for China’s wheat imports is a challenging job. A model based on so called “planning trade model” (Ennew, 1987; p111) is built and specified for China’s wheat imports.

Ennew stated that a model to explain grain imports for a planned grain system in the former USSR can be derived from the materials balance approach to trade planning. He developed a model to explain the behavior of import demand for grain in a planned economic system based on the Materials Balance Principle. Ennew combined the accounting differences from the materials
balance component of the model with one marketing variable, the hard currency/world price term. The final form of the model for a planning grain trade system in the former USSR is as following:

\[ WI_t = f(ED_t, UD_t, X_t) \]

Where:

- \( WI_t = \) net import demand for grain at time \( t \).
- \( ED_t = \) expected difference between demand and supply on the grain materials balance at time \( t \).
- \( UD_t = \) unexpected difference between demand and supply on the grain materials balance at time \( t \).
- \( X_t = \) the marketing variable term at time \( t \).

There are several points should be made. First, the Materials Balance Principle is a fundamental economic theory largely applied in former socialist countries such as former USSR and China. Second, almost every socialist country employed a centrally planned system in its national economic development, including the grain sector during the period from the 1950s to the early 1980s. Third, Ennew's model was built mainly for analysis of the former USSR grain import. At that time, the economic system in former USSR was still a centrally planned economy and market-oriented reforms had not started yet. However, this model can be modified and applied to an analysis of China's wheat imports because the theory on which the model was built also underlies China's current wheat import system.
A model reflecting China's wheat imports can be modified and derived from the materials balance approach with Ennew's planning trade model. According to Chinese socialist economic theory, the supply (output) component of the materials balance for grain depends primarily on the consumption requirement; the demand (input) component of materials balance for grain relies upon expected grain production. Therefore, a deficit between grain output and grain consumption requirements on the materials balance will exist if demand requirements exceed expected production. In the State Planning Committee's plan statements, generally speaking, the grain and other targets are internally consistent, although the grain targets (demands) themselves do not appear to be consistent with the productive potential of that sector. From the Chinese central planners' point of view, this deficit can be cleared by increasing supplies or reducing projected demand.

Moreover, unlike the situation in the former USSR, China started its marketing-oriented reform in 1978. Since then, the Chinese grain system has been a mixed system and its grain trade system has been decentralized. Therefore, the model for China's wheat import must clearly reflect the "mixed" domestic grain system. Since 1978 the decentralized domestic grain system and the centrally controlled grain foreign trade system, and the interactions between the government plans and internal free market force have changed China's behavior in international grain market. Therefore the planning trade theory can not satisfactorily represent China's demand for wheat import. It is also possible for Chinese planners to use one or two variables derived from the materials balance table that can adequately measure China's demand for wheat imports. Import demand for wheat is composed of the interaction between various economic factors in the currently more marketing-oriented "mixed" economy in China.
Section 6.5: Empirical Model and the Function Forms

To develop one model of Chinese wheat import that incorporates aspects of both the materials balance principle and the conventional western theory, a “mixed” model was specified and then estimated. This model allows us to test the hypothesis that the regime shifted from a pure materials balance to a more marketing oriented-model where grain imports depend on prices. The general form of the wheat import demand function is estimated as the following:

\[ WI = f(WIP, DUM, DWIP, ED, DED, UD, DUD, FOREX, DFOREX, LAGFTB) \]

where:

- \( WI \) = China’s wheat imports.

- \( WIP \) = wheat import price.

- \( DUM \) = dummy variable which takes 0 before 1978 and takes 1 thereafter.

- \( DWIP \) = wheat import price multiplied by DUM.

- \( ED \) = expected difference at pre-harvest.

- \( DED \) = expected difference multiplied by DUM.

- \( UD \) = unexpected difference at post harvest.

- \( DUD \) = unexpected difference multiplied by DUM.
\[ \text{FOREX} = \text{China's foreign currency exchange rate between the Chinese currency Yuan and the US dollar.} \]

\[ \text{DFOREX} = \text{FOREX multiplied by DUM.} \]

\[ \text{LAGFTB} = \text{China foreign trade balance lagged one year.} \]

There are two reasons for us to choose the current year’s \( ED \) and \( UD \), instead to choose lagged \( ED \) and \( UD \), as the indicators of the domestic balancing conditions of grain production and consumption. First, China has been a net grain importer since 1960 and wheat imports are essentially taken to fill the gap between domestic production and consumption. The appropriate measure for this gap is thus based on aggregate expected grain output \( (QE) \), actual grain production \( (QA) \) and grain consumption \( (QT) \) in the current year. Second, for the Chinese central government, the grain import plans are usually worked out before grain harvest period. Any expected difference \( (ED) \) should be considered in the grain import plans. By the same means, any unexpected difference \( (UD) \) should also been considered by the central government in the grain import plans. Therefore, the unexpected differences have certain influences on the grain import plans. Third, since the limited wheat imports in China are aimed at servicing direct food grain consumption, especially for feeding the urban population of metropolitan cities in the eastern coastal area, the time lag for distribution is small. Therefore, wheat imports should relate to the current year’s expected difference \( (ED) \) and unexpected difference \( (UD) \) in China’s domestic grain production.

In our model estimation, based on the theoretical considerations and the model specifications in previous sections, first, we expect that the importation of wheat is positively
related to the growth in domestic consumption requirements (i.e. the growth of the target output \( QT \)) give the expected outputs. Since \( ED = QE - QT \), if \( QE > QT \), \( ED > 0 \), the sign of the coefficient of \( ED \) should be negative while if \( QE < QT \), \( ED < 0 \), the sign of the coefficient of \( ED \) should be negative as well. Therefore the importation of wheat should always positively relate to a negative expected differences \( ED \) (i.e. the product of the estimated coefficient and values of \( ED \) is positive). Second, given the domestic production level achieved (certain amount of \( QA \)), increased domestic demand \( QT \) means a negative actual difference \( AD \). Since \( AD = QA - QT \), a negative domestic actual grain difference \( AD \) will require a positive grain imports and therefore more wheat imports from the world market. Third, given the grain target output \( QT \) and grain expected output \( QE \), (for a certain \( ED \)), wheat imports are also determined by each year’s actual grain output \( QA \) (i.e. \( UD = QA - QE \)). From a planning point of view, this implies that, other things being equal, a negative unexpected difference \( (QE > QA) \) will aggravate China’s reliance on foreign wheat imports and will push China to import more wheat than it expected in its grain trade plans. Therefore, an estimated coefficient of \( UD \) should be positive. While a positive unexpected difference \( (QE < QA) \) will reduce China’s reliance on foreign wheat imports and China’s wheat imports should be less than it expected in its grain trade plans. Therefore, a estimated coefficient of UD should be negative.

Since China’s domestic grain market has shifted from a pure materials balance principle to a more marketing oriented theory after 1978 when China started its economic reform. For the variables from the conventional marketing theory, one of our main hypothesizes is that the regime of China’s wheat import has more relied on marketing influential factors than it did before. Based on this hypothesis, we expect that the sign of the coefficient of the price should be negative to the
demand of wheat import. This shows that after 1978, even though the decisions of China’s wheat import still have been planned and controlled by the central government, the domestic marketing reform should indirectly affect the Chinese government decision on wheat import. The sign of coefficient of LAGFTB should reflect a negative relationship to China’s wheat import because if the Chinese foreign trade balance shows a negative from the last year, this negative balance will put a pressure on the central planners and, therefore, the central government probably reduce the amount of wheat import. For the FOREX, we expect the sign of its coefficient should be negative because if the exchange rate between the two currencies goes up, the wheat imports become more expensive and Chinese government needs to pay more in its wheat imports. Especially after 1978, China’s import policies are oriented toward imports of advanced technologies and equipment, more expensive wheat price certainly put a negative pressure on the central planners.
Chapter Seven:

Model Results and Analysis

Section 7.1: Estimate China’s Wheat Import Demand without Interactive Terms.

According to Ennew’s “planning trade theory” and the model specifications in Chapter 6, we first estimated a model with a dummy variable (DUM) for China’s wheat imports, named as Model 1. This model does not have any interactive terms (i.e. DWIP, DED, DUD and DFOREX). This will help us to see if a model simply built on a combination of “the Planning Trade Theory” and “the conventional marketing theory”, with the consideration of the Economic Reform can well present the characteristics of China’s wheat imports for the last 35 years. The estimated demand equation of China’s wheat imports was performed using OLS with a linear functional form as following:

\[ WI = b_1 + b_2 \ WIP + b_3 \ ED + b_4 \ UD + b_5 \ FOREX + b_6 \ LAGFTB + b_7 \ DUM \]

Table 7.1 represents the estimated results. The adjusted coefficients of determination \( R^2 \) of the estimated equation shows that about 75% of the variations in the equation of wheat imports has been explained by the independent variables. This indicates that even though we incorporate the combinations of different theories and a dummy variable representing as the system transition started in 1978, there are less than two thirds of the variations in quantity of wheat imports is associated with the variations of the independent variables from the early 1960s to the mid 1990s.
Table 7.1: Regression without interactive terms for China’s wheat imports (n=35).

<table>
<thead>
<tr>
<th>Nature of Variables</th>
<th>Model 1</th>
<th>Coefficient (t-stat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>Intercept</td>
<td>2510.6 (1.106)</td>
</tr>
<tr>
<td>Variables of Materials Balance Principle</td>
<td>ED</td>
<td>-1.3544** (2.010)</td>
</tr>
<tr>
<td></td>
<td>UD</td>
<td>-0.43217* (1561)</td>
</tr>
<tr>
<td>Variables from Conventional Marketing Theory</td>
<td>FOREIGN</td>
<td>-117.13 (0.2721)</td>
</tr>
<tr>
<td></td>
<td>LAGFTB</td>
<td>18.903** (2.156)</td>
</tr>
<tr>
<td></td>
<td>WIP</td>
<td>3.7688* (0.7427)</td>
</tr>
<tr>
<td>Dummy Variable</td>
<td>DUM</td>
<td>1934.8 (0.9680)</td>
</tr>
<tr>
<td>Average Price Elasticity</td>
<td>Average Price Elasticity</td>
<td>-0.627</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$R^2$</th>
<th>$R_{adj}^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6382</td>
<td>0.6104</td>
</tr>
</tbody>
</table>

Notes:
Figures in the parentheses are the t-ratios of the estimated coefficients.
*** significant at 1% level.
**  significant at 5% level.
*   significant at 10% level.

First, for the “Materials Balance Principle” variables (i.e. variables $ED$ and $UD$), the signs of the coefficients for both of these variables are consistent with what we expected. This means...
that as long as we get negative $ED$ (if $QT > QE$) and negative $UD$ (if $QA < QE$), the negative coefficients of $ED$ and $UD$ will produce positive amounts of wheat imports respectively. The coefficients of $ED$ and $UD$ pass $t$-tests and is significant at a 95% and 90% respectively. However, the absolute value of coefficient of $ED$ (1.3544) should be less than 1 which means that in order to meet the planners' expected differences in the grain plans, China should normally import 100% or less of its planned requirement of wheat imports. Therefore 1.3544 is not consistent with what we defined. The absolute value of coefficient of $UD$ (0.43217) is less than a unit and well matches what we defined in this model which means that China imports only 43% of its unexpected differences of its planned requirements for wheat imports from the international wheat market. That means there is more than 50% market room in China for wheat exporters to develop. However, if we add up the coefficients of the expected difference and unexpected difference, the results reveal that China imports about 90% (179/200, i.e. $1.3574 + 0.4322 = 1.79$) of its planned requirements for wheat trade each year during the observed 35 years. This indicates that China’s trade plan for wheat import has been well carried out.

Second, for the marketing variables (i.e. $WIP$, $FOREX$ and $LAGFTB$), the estimated results from Model 1 demonstrate that the empirical results do not provide very strong support for the hypothesis we had in previous chapter. The quantity of wheat imported responds positively to changes in the prices of the international wheat market but the coefficient of the price variable is insignificant from zero. There are four possible explanations for this. First, the primary purpose of China’s wheat imports was to fill the gap between domestic supply and demand. When this is further compounded by the bureaucratic style of trade manipulation, it is not so surprising to find that the sensitivity of China’s wheat imports to the changes in world prices is considerably blunted.
Second, China’s wheat import mainly came from the western countries, wheat trade was therefore under strong influence from political and diplomatic developments, especially during the first period from 1960 to 1978. Third, the blurred relations between price and quantity of wheat imports may also be affected by the uncovered effect of trade treaties such as wheat treaties with Canada and other countries. Fourth, the most important point is that Model 1 did not consider the impact of the Economic Reform which probably have certain impacts on several independent variables in the estimated equation of China’s wheat imports. Since we expected that the variables from the conventional marketing theory, such as the price of wheat imports, should be significant at certain level for China’s wheat imports during the second period, therefore the estimated results of price from Model 1 is different with what we expected in Chapter 6.

For the coefficient of FOREX, although its sign is negative which is as the same as we expected, it does not past t-test. The coefficient of LAGFTB is significant at 95% level. Since we defined the variable LAGFTB as China’s foreign trade balance with one year lagged, the coefficient (18.903) reveals that China’s wheat imports would increase (decrease) 18.903 units if its foreign trade balances from the last year are positive (negative). The signs of independent variables FOREX and LAGFTB present what we expected. For variable LAGFTB, the Chinese foreign trade balance with one year lagged, a positive balance from the previous period will probably give the Chinese government more freedom to import more wheat; if a negative balance prevailed, the Chinese government would probably restrict or reduce wheat imports.

Third, for the dummy variable (DUM), even though it in essence states that China’s wheat imports can be partially influenced by the economic reform policies during the second period, but it fails to pass the t-test. This is not what we expected.
For the model's predicted power, the figure 7.1 presents the observed values and the predicted values from the regression of Model 1.

**Figure 7.1: Actual and Predicted Wheat Imports from 1960 to 1994 (Model 1).**

It is obvious that the predicted ability of Model 1 is quite poor. One of possible reasons is that since Model 1 does not consider the interactive impacts of the Economic Reform on both planning variables and marketing variables, therefore, it is not appropriate for directly apply Ennew's model to estimate China's wheat import even though Ennew's "planning trade" model was designed for central planned and controlled economic system. We need indicate that through the interactions between the Chinese government's grain plans and the decentralized domestic
grain market, the grain demand and supply in the central plans should be affected indirectly by factors of decentralized policies and domestic grain market.

The absolute value of the price elasticity of import demand for wheat is less than 1 (0.627) which means for the overall period from 1960 to 1994, the China's import demand for wheat was not sensitive to changes of international wheat prices. The magnitudes of the inelasticity of wheat import demand indicates that the own price of wheat import has little impact on wheat imports.

As previously mentioned, Model 1 probably misspecified and the estimated results are correspondingly inappropriate. The interactive terms of dummy variable and other variables may be required by the nature of demand equation of China's wheat imports. An F-test of null hypothesis that the interactive terms jointly have no influence on imports is rejected at the 5% level. This suggests that the interactive terms should be included in a model used to estimate China's wheat imports.

7.2: Estimate Demand of China’s Wheat Imports with Interactive Terms.

The Chinese government has presented different grain policies in different periods since the 1960s. Because the issues of policy changes are quite complicated and varied from year to year, they are not included in the analysis. However, we are interested in testing the impacts of economic reform policies which were carried out since 1978 on both planned variables and marketing variables. First, impact of this policy on the own price of China’s wheat importers $WIP$ (i.e. interactive term $DWIP$); Second, the effect of this policy on the term expected differences $ED$ (i.e. interactive term $DED$), and third, the effect of this policy on the term unexpected difference
UD (i.e. interactive term DUD) the and fourth the effect of this policy on the term foreign exchange rate FOREX (i.e. DFOREX).

We separately estimate these four models. Model 2 was first estimated with Model 1 plus the interactive variables DWIP. Model 3 was then estimated with Model 1 plus the interactive variables DWIP and DED. Then Model 4 was estimated with Model 1 plus the interactive variables DWIP, DED and DUD. Finally Model 5 was estimated with Model 1 plus the interactive variables DWIP, DED and DFOREX. The regression results from these estimations are presented in Appendix 4.8.

The final functional form was estimated as the following:

**Model 6:**

\[
WI = b_1 + b_2 \ WIP + b_3 \ ED + b_4 \ UD + b_5 \ FOREX + b_6 \ LAGFTB
+ b_7 \ DUM + b_8 \ DWIP + b_9 \ DED + b_{10} \ DUD + b_{11} \ DFOREX
\]

and its estimated results are presented in Table 7.2. In Table 7.2, we grouped all variables into four categories. Variables such as ED and UD in the first group are variables from the “Material Balance Principle”. Variables such as WIP, FOREX AND LAGFTB in the second group are variables from the “conventional marketing theory”. Dummy variable DUM itself is in the third group. Variables such as DED, DUD, DWIP and DFOREX in the fourth group are the interactive terms (i.e. they are slope dummy variable). Table 7.2 reveals that the estimated parameters and their signs display certain characteristics and some of them support what we expected.
<table>
<thead>
<tr>
<th>Nature of Variables</th>
<th>Variable names</th>
<th>Model 6 Coefficient (t-stat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>5162.3 **</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.932)</td>
</tr>
<tr>
<td>Variables of Materials</td>
<td>ED</td>
<td>-0.49036 ***</td>
</tr>
<tr>
<td>Balance Principle</td>
<td></td>
<td>(2.4689)</td>
</tr>
<tr>
<td></td>
<td>UD</td>
<td>-0.3038</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.5753)</td>
</tr>
<tr>
<td>Variables from</td>
<td>FOREX</td>
<td>79.612</td>
</tr>
<tr>
<td>FOREX</td>
<td></td>
<td>(0.024)</td>
</tr>
<tr>
<td>Conventional</td>
<td>LAGFTB</td>
<td>16.135 **</td>
</tr>
<tr>
<td>Marketing Theory</td>
<td></td>
<td>(1.934)</td>
</tr>
<tr>
<td></td>
<td>WIP</td>
<td>1.5799</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2795)</td>
</tr>
<tr>
<td>Dummy Variable</td>
<td>DUM</td>
<td>-4834.3 ***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.215)</td>
</tr>
<tr>
<td>Interactive Terms</td>
<td>DED</td>
<td>-0.6142 ***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-3.292)</td>
</tr>
<tr>
<td></td>
<td>DWIP</td>
<td>189.01 *</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.232)</td>
</tr>
<tr>
<td></td>
<td>DUD</td>
<td>-1.0066 **</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.676)</td>
</tr>
<tr>
<td></td>
<td>DFOREX</td>
<td>954.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.2812)</td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>0.8712</td>
</tr>
<tr>
<td>R²adj</td>
<td></td>
<td>0.8495</td>
</tr>
</tbody>
</table>

Notes:
Figures in the parentheses are the t-ratios of the estimated coefficients.

*** significant at 1% level. ** significant at 5% level. * significant at 10% level.

The results show that the coefficients on the expected difference ED (-0.4903) and unexpected differences UD (-0.3038) display negative signs. Since ED = QE - QT, if ED is negative (i.e. QT > QE), a negative coefficient indicates that more grain consumption required in
government grain plan. Therefore, more grain imports is probably needed. A negative coefficient of $UD$ reflects the fact that a large negative differences between actual output $QA$ and expected output $QE$ (i.e. $UD = QA - QE$ and $QE > QA$) should produce a large positive level of wheat imports. At the same time, the parameters satisfy the requirement that they should be less than or equal to unity (a value for either parameter in excess of unity would suggest that China is consistently importing in excess of its deficits). That means that only about 50% of any expected difference are made up by wheat imports and about 30% of any unexpected difference are made up by wheat imports. The two figures imply that China imports about 80% of its grain deficit. The fact that coefficient of $ED$ is significant from zero at 1% level indicates that the central planning in wheat imports plays a important role.

All the signs of three “marketing” variables $WIP$, $FOREX$ and $LAGFTB$ (wheat import price, foreign exchange rate and lagged foreign trade balance respectively) are not as same as what we expected. The coefficients of $WIP$ and $FOREX$ are insignificant while the coefficient of $LAGFTB$ is significant at 95% level which is acceptable. One thing we need to point out is that the significance of $WIP$ should have the same explanation as we discussed in Model 1. The reasons that two of three marketing-oriented factors are insignificantly different from zero and one of three is only significant at 95% level probably suggest that first, China’s wheat imports are still centrally controlled and planned. The Materials Balance Principle still dominates China’s wheat imports. Second, political consideration or foreign policies still heavily influences China’s wheat import instead of pure marketing factors. This approves that without the impact of Economic Reform on these variables, China’s wheat imports are still presented by the characteristics of the “planning trade” theory.
The sign of the coefficient of variable DUM indicates that the Economic Reform in China's grain system has a negative impact on China's wheat imports. The fact that the coefficient of the dummy variable is significant at 99% level indicates that the Economic Reform has presented a very strong influence on China's wheat imports since 1978. As we stated in previous chapters that the impact of the Economic Reform on China's wheat imports should have dual influences. First, the transition of China's domestic grain system from a central planned and controlled system to a marketing-oriented system has dramatically increased China's grain output (QA) and this should have a negative impact on China's wheat imports. Second, the policy changes started in 1978 should make the Chinese government more sensitive to the demand pressure (QT) of a population experiencing rising income. Therefore the interactive impacts on QE, further on ED and UD from the Economic Reform (DUM) should have more implications.

The negative sign of the coefficient of the variable DED is as same as what we expected. The coefficient reflects the fact that the economic reform policy carried out in China since 1978 has had a quite impact on ED through the increase on the differences between QE and QT. This impact created an upward trend in China's wheat import since 1980 because the demand of grain (QT) has been greater than planner's expected output (QE). The parameter on the variable (DED) is significantly different from zero, indicating that expected demand has a stronger effect on China's wheat import after 1978 than before. Furthermore, the size of the coefficient on the variable DED is 0.6142, which is significantly different from one, indicating that since 1978 China has imported about 60% of its expected difference in wheat requirements. This reveals that since 1978, China's wheat imports have been still dominated by the central government and 60% of its total wheat imports has been generated from the grain trade plans. The fact that the t-test of the
coefficient of $DED$ is significant at 99% level strongly supports this point. This may partially explain why China needs more wheat imports even though the economic reform has brought successful grain production since 1978. The $t$ ratio of coefficient of $DED$ is significantly different from zero implying that the nature of grain planing in foreign trade did not diminish after 1978.

The coefficient (-1.0066) on the slope dummy variable $DUD$ shows that even though China has been carrying out its grain system reform, the amount of imported wheat for meeting the unexpected difference $UD$ are as the same as the amount China imported before 1978 (about 100% of China's unexpected difference has made up by imports after 1978). Comparing to the coefficient (-0.6142) on interactive term $DED$, the coefficient of $DUD$ means that after 1978 China has to import full amount of its unexpected difference in wheat demand from the international wheat market. This also implies that the factor of unexpected difference ($UD$) has played more important role after 1978 than the factor of expected difference ($ED$) has done. The coefficient of $DED$ (-0.6412) implies that China still imports 60% of its expected grain deficit, which suggests that about 40% of grain deficit is made up domestically by free market activities and the adjustment of inter-provincial-governments with central grain plans. On the other hand, this figure also implies that if central grain plan and control diminished, China should need more grain imports given the current situation of domestic free grain market. This suggests that there would be some potentially market for grain exporters to develop.

Our hypothesis in previous chapter indicated that both wheat import prices and foreign exchange rates should individually have negative impacts on China's wheat import after the marketing reform started in 1978. However, the results from our regressions do not fully support this assumption. As presented in Table 7.2, the coefficient of the interactive variable $DWIP$ has a
positive sign, even though it is insignificant from zero, which is not what we expected. This unexpected positive sign for the coefficient of interactive term $DWIP$ can be probably explained by the following:

First, since the data of the price we used in this regression is an average wheat import price deflated by export price index of international wheat market, the price sensitivity to individual price of each exporter probably diminished. However, even though the price responses of China's wheat imports are positive, it does not mean each individual imported deal can not be negatively sensitive to import prices. Second, because China's wheat imports have still been dominated by central plans after 1978, the influence from the general trend of prices in the international wheat market probably is not significant in China's decisions of wheat imports. Third, since grain supply has been taken by the Chinese government as one of the most important factors affecting China's political and social stability, necessary wheat imports based on political considerations are not subject to the changes of the prices. This is also supported by the $t$-test for the coefficients of the interactive terms $DED$ and $DUD$. The coefficients of these two interactive terms are significant at the 1% level. This evidence suggests that the level of wheat imports in the second period (from 1978 to 1994) are still centrally planned and controlled. The interactive impacts of the economic reform and planning control have significantly affected China's wheat imports.

The price elasticities of the wheat import demand calculated from Model 6 are contained in Table 7.3. Since the purpose of this study is to test if the prices after 1978 are becoming more determinant in China's wheat imports than they were before 1978, we calculated the price elasticities of wheat import demand to China for the two periods in order to give us a comparisons for the two periods.
Table 7.3: Price Elasticity for China Wheat Imports for the first and the second periods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Price Elasticity</th>
<th>Year</th>
<th>Price Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>0.7302</td>
<td>1978</td>
<td>0.01290</td>
</tr>
<tr>
<td>1961</td>
<td>0.0001</td>
<td>1979</td>
<td>0.0592</td>
</tr>
<tr>
<td>1962</td>
<td>0.1567</td>
<td>1980</td>
<td>0.0101</td>
</tr>
<tr>
<td>1963</td>
<td>0.0222</td>
<td>1981</td>
<td>0.0222</td>
</tr>
<tr>
<td>1964</td>
<td>0.1233</td>
<td>1982</td>
<td>0.0176</td>
</tr>
<tr>
<td>1965</td>
<td>0.1808</td>
<td>1983</td>
<td>0.0021</td>
</tr>
<tr>
<td>1966</td>
<td>0.1252</td>
<td>1984</td>
<td>0.0029</td>
</tr>
<tr>
<td>1967</td>
<td>0.9544</td>
<td>1985</td>
<td>0.0122</td>
</tr>
<tr>
<td>1968</td>
<td>0.0003</td>
<td>1986</td>
<td>0.0376</td>
</tr>
<tr>
<td>1969</td>
<td>0.0844</td>
<td>1987</td>
<td>0.0781</td>
</tr>
<tr>
<td>1970</td>
<td>0.0550</td>
<td>1988</td>
<td>0.0037</td>
</tr>
<tr>
<td>1971</td>
<td>0.0106</td>
<td>1989</td>
<td>0.0008</td>
</tr>
<tr>
<td>1972</td>
<td>0.0369</td>
<td>1990</td>
<td>0.0037</td>
</tr>
<tr>
<td>1973</td>
<td>0.0412</td>
<td>1991</td>
<td>0.0025</td>
</tr>
<tr>
<td>1974</td>
<td>0.0125</td>
<td>1992</td>
<td>0.0006</td>
</tr>
<tr>
<td>1975</td>
<td>0.1106</td>
<td>1993</td>
<td>0.0007</td>
</tr>
<tr>
<td>1976</td>
<td>1.1307 *</td>
<td>1994</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

* only in 1976, the price elasticity of demand for wheat imports is greater than 1.

Table 7.3 shows the price elasticity for China’s wheat imports computed at the means. For the last 35 years, the absolute value of the price elasticity in average for wheat import demand is less than 1 which indicates that during the period of 1960 to 1994, the quantities of imported wheat were not affected by the price of international wheat market. Moreover, the prices of wheat imports were not main determinants of China’s wheat import demand after 1978 when China
started to reform its grain system, despite the fact that China’s domestic grain system has been
decentralized. Actually, China’s system of grain foreign trade, especially its system of wheat
imports has been not changed and it has been centrally controlled since 1978. Under this
circumstances, the prices of wheat imports are generally assumed to be of secondary importance
to the political objectives.

Second, the table 7.3 reveals that the degree of sensitive to the changing conditions of
prices in world wheat market declined after 1978. The price inelasticities of wheat import demand
increased in average from about 0.2 before 1978 to less than 0.03 after 1978. However, it was
1988 that the average price inelasticity of China’s wheat imports increased to less than 0.001. this
was because that Chinese government tightened the control over its wheat imports after several
years trial of decentralized grain foreign trade. This probably was the key reason that China’s
wheat imports fluctuated during the mid 1980s.

The graph of the actual (solid line) and predicted (dashed line) wheat imports appears in
Figure 7.1. the graph reveals that the demand model (Model 6) of China’s wheat imports quite
well predicts the general pattern of actual wheat imports. However, for some individual years, the
quantity of imports are not well predicted in Model 6 for certain reasons. One of the reasons for
the poor predictive power of the model for certain years may be that China’s wheat import policy
has been affected by forces specific to those individual years that are not part of an overall import
trend.

*Figure 7.1: Actual and Predicted Wheat Imports in China from 1960 to 1994 (10,000 tonnes).*
In summary, the demand model of wheat imports developed in this research has approved that the role of planning in determining the volume of wheat imports into China. The hypothesis that after 1978 marketing variables have more power in determining China’s wheat imports has not been approved. However, the policy changes in the second period do have impacts on China’s wheat imports. Instead of price determination of wheat imports after 1978, China’s grain supply and demand continuously have dominated China’s wheat imports not only before 1978 but also thereafter.
As pointed out in previous chapters, wheat import demand in China affected by not only the determinant factors which we used in the models but also by general grain trade pattern in China and the interaction between China’s domestic grain market and the international grain market. It is therefore necessary to generally assess possible future patterns of China’s grain trade such as China’s future net trade position, the scale of grain trading in China and the composition of China’s future grain trade.

Section 8.1: China’s future net trade position

Carter, McCalla and Schmitz stated “the issue of China’s net trade position in the future is difficult to forecast” (1989, p 23). To face this difficult issue, it is necessary to look into the essential features of today’s China — a vary large population with rapid growth of personal income, nationwide industrialization with shrinking arable land, decentralization of the internal grain system with more marketing-oriented foreign trade.

First, struggling to feed nearly one quarter of the world’s population with only 7 percent of the arable land has always been a formidable task. This is why China has been a net grain importer throughout most of this century except during the 1950s. Although the present socio-political environment in the nation is rather different from that in the 1950s, population growth and personal income increases have put a great deal of pressure on domestic grain supply since the late 1970s. It is expected that within this century, population growth will almost certainly again exceed
the 1 percent annual rate set by the government. It is also foreseeable that the growth of GNP and the increase in personal disposable income will go beyond that pace specified by the government. Consequently, the current trend of a tremendous pressure of demand for grains, both for food and feed, as well as the situation of domestic grain production exceeded by consumption will continue for the foreseeable future. Under these circumstances, net imports of grain are absolutely necessary to fill the gap. In summary, given the social, political and economic issues reviewed, it is believed that China is extremely unlikely to become a systematic net grain exporter once again in the next 10 to 20 years. Instead, the current position of net grain importation will continue for the foreseeable future.

Second, as Brown (1995) pointed out, the industrialization process means sacrificing grain land. Analysts of the world food supply/demand have predicted that the demand for grain in China would climb dramatically as industrialization accelerated and income rose. Historically, any densely populated country, in its process of industrialization, would face conversion of grain land to other uses. As grain land losses accelerated, they soon exceeded rises in land productivity, leading to steady declines in output. (Brown, 1995) Although this is, perhaps, not the result of agricultural failure but of industrial success, the combination of continually expanding population and a shrinking grain land base in China will further reduce the already small area of grain land per person. Ironically, after almost ten years rapid development in modernization, the industrialization has been already accelerating since the late 1980s. For example, China’s grain area dropped from 90.8 million hectares in 1990 to an estimated 85.7 million hectare in 1994. This annual drop of 1.26 million hectares, or 1.4 percent, has been continuing since the early 1990s.
Third, the present socio-political environment in China would not tolerate an overcentralized control over its grain system and an overemphasis on the development of heavy industry with the neglect of people’s daily living standards. Instead, balanced development with a more decentralized grain management system and the introduction of market mechanisms are now pursued. The efforts to improve people’s daily living standards is regarded as one of the key elements both to motivated individual initiative in development and to encourage the people’s enthusiastic support for the cause of restructuring. Thus with the abolition of the grain compulsory purchasing system, the nationwide decentralization will enforce market mechanism and price function in both internal grain system and international grain market. Therefore, the day of forced extraction of grains for export are gone.

Section 8.2: The scale of China’s net grain trade.

With the continuation of the “open door” policy and continuing efforts in encouraging the further expansion of foreign trade in the future, there will be no obstacle to trade in terms of socio-political consideration as there was during the 1960s and the 1970s. Nevertheless, there are three particular factors which we think will play an important role in limiting the growth of net grain imports. First, the centrally controlled and planned grain trade system will continue to play a key role in grain imports. Second, the price difference between domestically procured grain and grain procured from international trade will become more of a determinant in grain trade plans than it did before because economic rationality will continue to be an important motivation in the new marketing-oriented grain system. Third, most importantly, as Chinese leaders repeatedly address a huge volume of net grain imports could cause political problems. Premier Li Peng (1995) pointed
out that "agriculture is the foundation of our socialist marketing economy, grain is the basis of that foundation. Our grain requirement can not rely on international grain market. We must firmly carry out our grain self-sufficiency policy. This is the key of our political stability and our economic reform" (p. A1). Historically speaking, grain is an important product for the nation both in terms of economic development and political stability. An obvious failure in boosting domestic production to catch up with consumption requirements would be regarded as evidence of the failure of current socio-economic reform. The sensitivity of this issue is clear from the rigorous political debates amongst the top leadership when the issue of the stagnation of grain production is raised. Therefore, in addition to the possible constraints on balance of payments, grain prices in international market, domestic grain output and the weakness in infrastructure as mentioned in Chapter 2, a dramatic increase in net grain imports would be regarded as politically unacceptable for the administrative system. This is far more important than other factors in previous models both in conventional and planning trade models.

However, reluctance to accept a massive grain, especially wheat, import is one thing and the reality which force the government eventually to import massive amount of grain is another thing. Brown (1994) predicted that grain imports in China will be somewhere between 207 million tonnes to 369 million tonnes from 2000 to 2030. Although Chinese officials and scholars disagree with Brown's analysis and prediction, some of Chinese grain economists admit that China would import more grain than it did before and the amount it need to import before 2030 should be around 50 million tonnes annually (Ruofeng Niu, 1992; Zhe Zhu, 1996). We believe that China

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will continue to import more wheat than it did during the 1980s and the first part of 1990s but the composition of total amount of grain import need to be carefully analyzed and predicted.

Section 8.3: The composition of China’s grain imports.

After we described the position of China’s net grain trade and the scale of China’s net grain trade, one question that still needs to be answered is the composition of grain imports. During the last three decades, China’s grain imports were dominated by wheat for the purpose of direct human consumption. Given that the per capita grain availability has improved substantially since the end of the 1970s, most researchers have suggested that future grain imports in China will be dominated by the demand for indirect grain consumption, that suggesting imports of corn or coarse grain as feed grain would be the predominant component instead of wheat (Kueh 1984, p925; World Bank 1985b, pp35-105; Carter and Zhong 1988, p 136; Carter, McCalla and Schmitz 1989, p26). Actually even through China is facing many issues such as increases in personal income, changes in people’s diet, marketing-oriented reform, decentralization in the internal grain system, in the composition of grain imports, wheat will remain a most important component of grain imports for the next ten to fifteen years. Our conclusion is established mainly on the following three factors. First, because of the higher population growth rate expected, larger volumes of food grain consumption are projected in many studies. Second, one of the major characteristics of the Chinese people’s dietary improvement during recent years is the increases in proportion of fine grain (rice and wheat) in food grain consumption. It is expected that this trend will continue in the future. Third, historically, wheat imports have been distributed mainly in the eastern coastal areas, and one of the main reasons for this is the weakness in the transportation and
distribution system which results in greater costs for wider distribution. Since there can be no realistic expectation of drastic improvement in infrastructure in the near future, fine grain, especially rice, will continue to be used to feed animals in vast rural areas in central and south China, and imported grain will continue to be distributed as food grain in the coastal areas, especially for the major cities and towns. In summary, the proportions of wheat and other grain in the future grain imports will not only be critically dependent upon the composition of direct and indirect consumption's of grains, but also, and equally important, on the improvement in the grain distribution system which is the key to a more rational use of grains.

In conclusion, although the possibility of China becoming a net grain exporter is regarded as most unlikely in the foreseeable future, a massive increase in grain imports, especially in wheat import, is also considered as impossible for various reasons especially because of its highly political sensitivity. Therefore 30 million tonnes to 40 million tonnes of net wheat imports are believed to be the maximum level within the next 30 years. We believe that factors which greatly influenced the historical development of grain trade, especially wheat import, will continue to play important parts in the future, meanwhile the factors emerged from the "open door" policy and from the marketing reform in domestic grain system will put great deal of pressure on China's centrally controlled wheat importation. Therefore, in addition to an increase in coarse grain imports and limitation of grain exports, wheat will remain as a major product in China's grain imports in the foreseeable future.
Chapter Nine:

Conclusions

The primary focus of this study has been an attempt to understand the economic system which have shaped the grain economy of China in the different periods since the early 1960s. Based on this understanding, this study tried to determine an appropriate theory and method to model China's wheat import. A "mixed" trade model has been established for estimating China's wheat imports.

Section 9.1: Conclusions of this study.

The major conclusions in this study are: 1> The prominent characteristics of China's grain economic system are different in the different periods. China's grain economic system was a centrally planned system in the first period while it was a "mixed" system in the second period. Therefore, the determinants of wheat import demand under a mixed system have been jointly from planning and marketing forces. 2> The economic reform started in 1978 has brought fundamental changes in China's grain production management, domestic grain marketing system, grain consumption and its foreign trade system. However, China's grain foreign trade, especially its wheat imports, has not been changed that mush as in other areas. 3> Given China's unique grain foreign trade characteristics, the planning trade theory is more realistic for modelling China's wheat import demand. 4> with the planning trade model, price signals in the world grain market did not play an important role in China's wheat imports during the second period. Such a model
will help understand China’s position in the overall international wheat trade market and how China’s grain policy changes affect the world grain market.

Section 9.2: Further studies and research direction.

Although the results from the study has been able to answer some important questions regarding China’s grain foreign trade policies, system transition and wheat import demand, some areas could be explored further to obtain a better understanding planning trade theory and realistically modelling China’s wheat import demand. One thing we should consider in the future’s study is how to incorporate the planning trade theory with modelling “Strategic Trade Theory” which is established on the western conventional trade theory and the game theory. Since among China’s major wheat exporters, it is probably more important to further analyze how each exporter can determine its exporting price given current China’s wheat import characteristics.

This research should be extended to connect the proposed model with the world grain market. Although world wheat prices have been considered in the model, the model is still national. To improve the situation, a detailed domestic market for major country or group of countries should be included. Import demand/export supply can be formulated by using the definition of excess demand/excess supply in each domestic market. In comparison with the national model, such a nonspatial model could provide more realistic information for international grain trade and policy analysis.

In our model, we did not incorporate China’s domestic grain procurement prices into our model. For possible grain marketing decentralization in future, domestic grain procurement prices and retail prices should be considered into the model. This will connect China’s internal grain
market with external grain market and better connect the planning trade model with the western conventional trade model.

Finally, the planned trade theory based on the materials balance principle need to be better modified with China’s possible decentralization in near future for grain foreign trade. Yet it is a very complicated issue and need more time and knowledge to cope with, but it is worth to analyze because China currently is one of the most important wheat importers in today’s world.


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Appendix 1: Abbreviations

AWB: The Australian Wheat Board.

BOC: Bank of China.


COFCO: China National Cereal, Eatable-Oil and Foodstuff Export and Import Corporation.

CWB: The Canadian Wheat Board.


MOA: Ministry of Agriculture

MOFERT: Ministry of Foreign Economic Relations and Trade.

NYTJ: Nong Yie Tong Ji (Chinese Agricultural Statistics).

SPC: State Planning Commission.

SSB: State Statistics Bureau.

TJNJ: Tong Ji Nian Jian (Statistics Yearbook).

USDA: Department of Agriculture, The United States of America.

Appendix 2:

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### Appendix 2.1: Regression Results of Model 2, Model 3 and Model 4.

<table>
<thead>
<tr>
<th>Nature of Variables</th>
<th>Variable names</th>
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<th>MODEL 3 with DUD</th>
<th>MODEL 4 with DFOREX</th>
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Notes:

Figures in the parentheses are the t-ratios of the estimated coefficients.

*** significant at 1% level.

** significant at 5% level.

* significant at 10% level.
Appendix 2.2: State Grain Management System in China.

Appendix 2.3: General Structure of China's Grain Marketing System.

State Planning Committee

- MOFERT
- Provincial and Municipal Governments
- Ministries and Bureaus in Central Level
- Bank of China
- Banks
- Central CNCOFIEC
- Local CNCOFIEC

Ministry of Internal Trade, MOFERT and State Grain Bureau and Their local branches

- Grain Import and Export
- Internal Grain Distribution System
- Internal Grain Procurement System

- Subsidy Measures
- Transportation
- Grain Stock

Urban Households Consumption
Other Grain Users
Regional Grain Movement
Collect Storage
Purchase methods
Purchase Prices

Government Planned Grain Market

International Grain Market

Grain Free Market
Non-Government Grain Market
### Appendix 2.4: Grain Procurement Prices in China 1952-1994 (Yuan/Tonnes).

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<th>Year</th>
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**Sources:**